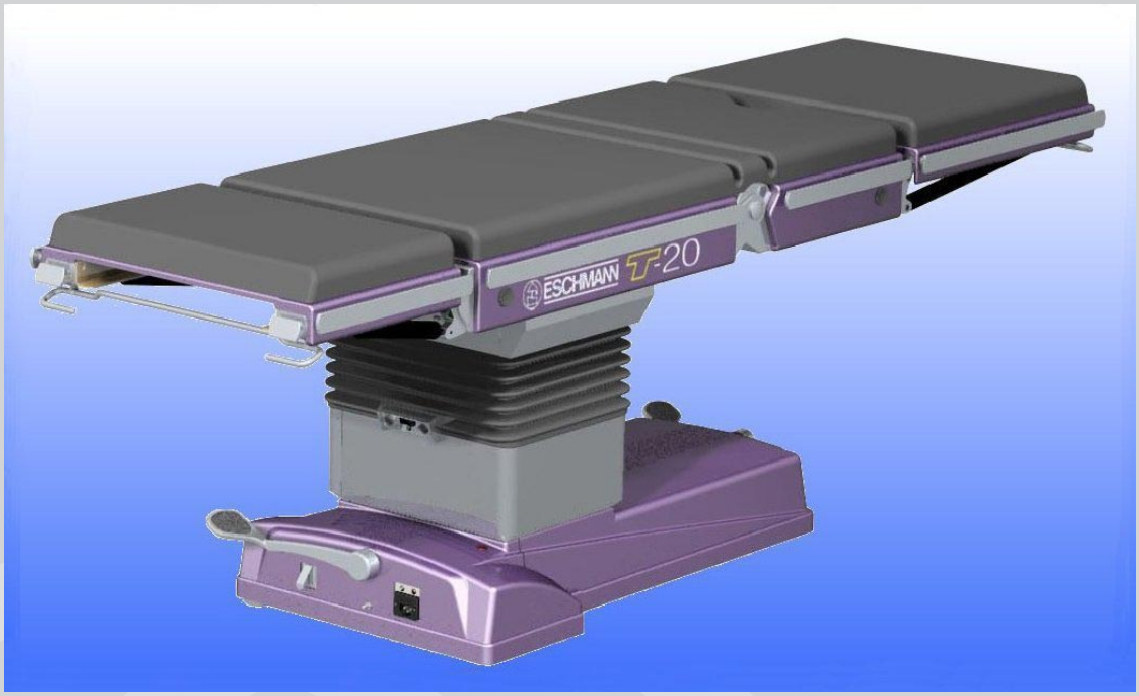
ESCHMANN

T20-a

OPERATION TABLE



Service manual

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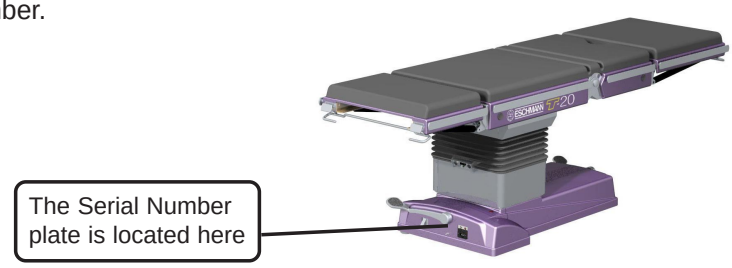
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Read these Instructions before use

Keep these 'Instructions' in a safe convenient place for future reference. Read in conjunction with the Publications detailed in Section 1.1.

Eschmann After Sales Service Department

The Eschmann After Sales Service Department is staffed and equipped to provide advice and assistance during normal office hours. To avoid delays when making enquiries, please quote the Model and Serial Number of your Operation Table which is shown on the Serial Number plate, the location of which is shown below. Please ensure you include all alpha and numeric digits of the Serial Number.



For further information visit www.eschmann.co.uk

All correspondence relating to the after sales service of Eschmann Equipment to be addressed to :

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Overseas Customers

Contact your local distributor. In case of doubt contact Eschmann Equipment.

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CE 0473 The CE marking affixed to the product certifies that it complies with the European Medical Devices Directive 93/42/EEC and related legislation.

T-SM47j July 2005

CE 0473

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1.0 PRELIMINARY INFORMATION

WARNING

Before servicing this operation table the engineer should be familiar with all the warnings and cautions contained within the 'Instructions for use' detailed in section 1.1.
This service manual does not provide details of how to operate the table nor does it provide information on the symbols and warning signs provided on the table. All this information is in the 'Instructions for use' supplied with the table.
Additional copies of the 'Instructions for use' can be obtained from Eschmann Equipment.
Only qualified and trained engineers should service or maintain this operation table to ensure that all the built-in safety features are not compromised.

1.1 This Service Manual should be referred to for details of the T20-a Powered Operation Table, Serial Number (SN) T2AA3A0000 or above:

REF T20-223-2301*	&	T20-108-2301*
REF T20-221-2301	&	T20-106-2301
REF T20-221-2101	&	T20-106-2101

**** These models have Denyer style accessory side rails.***
The related publications listed below provide additional information.

T-IM102 (111701) - Instructions for use
T-IPL35 (111706) - Illustrated parts list
T-IM94 (111012) - 'T' Series Application software manual
T-IM56 (698907) - General accessory leaflet

The number in brackets above, is the part number for that publication.

1.2 'Instructions for use' and 'Service manuals' should be readily accessible for reference prior to and when operating, cleaning, servicing, or, maintaining the operation table.

1.3 The table and all accessories are not supplied sterile therefore the table and all accessories should be cleaned and disinfected in line with hospital practice and the information supplied in the 'Instructions for Use' before use.

1.4 The manuals listed above and the Application software, are available to order from Eschmann Equipment, see inside front cover for address details.

1.5 Make sure that routine servicing is carried out as detailed in the service schedule, section 5.4, by Eschmann trained or accredited engineers.

1.6 The service schedule provided in this manual details a program of maintenance work to be carried out at six monthly intervals, refer to the applicable section of this manual for details of how to perform these various functions. Any special adjustments required for components are detailed in the part replacement (section 6.0) for that item to save duplication. As routine the Service Schedule should be followed in the event of an additional service due to a fault developing with any aspect of the table, this will ensure that all aspects of the table are covered.

WARNING

Ensure that the correct screw torque settings are used as detailed within this manual to ensure safety and that parts are not damaged.

1.7 Throughout this manual there are recommended torque settings for many of the screws. In the main, these are only provided on the illustrations. Ensure that these are checked and the correct torque settings are used where specified. These are provided to ensure safety (i.e. screws are tightened correctly) and that components are not damaged by excessively high torques.

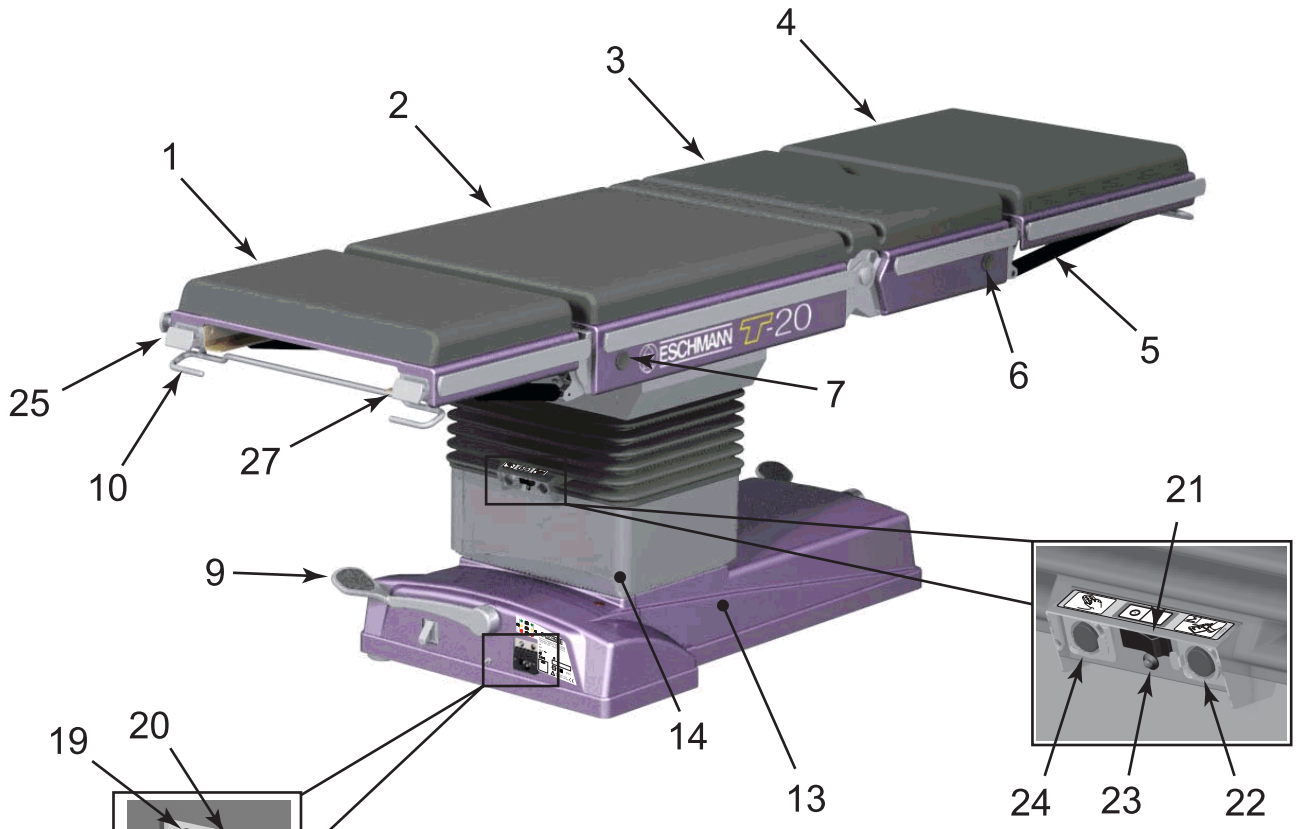
1.8 Fig. 1.0 identifies the main parts of the T20-a operation table.

1.9 The table can be placed into a 'Service Position' that provides easy access to components within the 'top of column' area (ensure table is switched 'off' before opening top). To achieve this position first note the safety warning in section 4.1. Remove as much as possible from the table top (e.g. leg and head sections, accessories and mattresses etc.). Remove the top of column steel covers (items 13 and 14 of Fig. 6.1). Remove the four M10 screws (each side) that secure the trunk sections to the pedestal (not the M6 cap head screws that can be seen passing through the oilite bushes on each side) and allow the trunk section to pivot (short trunk down) about the oilite bush pivots (item 16, Fig. 6.3). Extreme care should be taken at all times with the table in this position, especially during transition into and out of the 'Service Position'. Use tool number T2203 to maintain contact between the connector blocks if required when the table is in the 'Service Position'. When returning the table out of the 'Service Position' ensure the eight M10 screws are tightened to the correct torque and that the covers are replaced.

1.10 The 'Instructions for use' (provided with the table) contain all the cleaning, disinfection and care instructions, consult this for these aspects as they are not duplicated in this manual.

CAUTION

Continued use of the table batteries when 'critically low' can damage the batteries. Charge batteries regularly to maintain peak performance. Do not remove the table from charge until both charging LED's are 'green' to avoid false battery level indication on the handset.



NOTE: The table illustrated has external pedal locking catches. Some tables have internal locking catches, see section 6.2 and 6.3 for details.

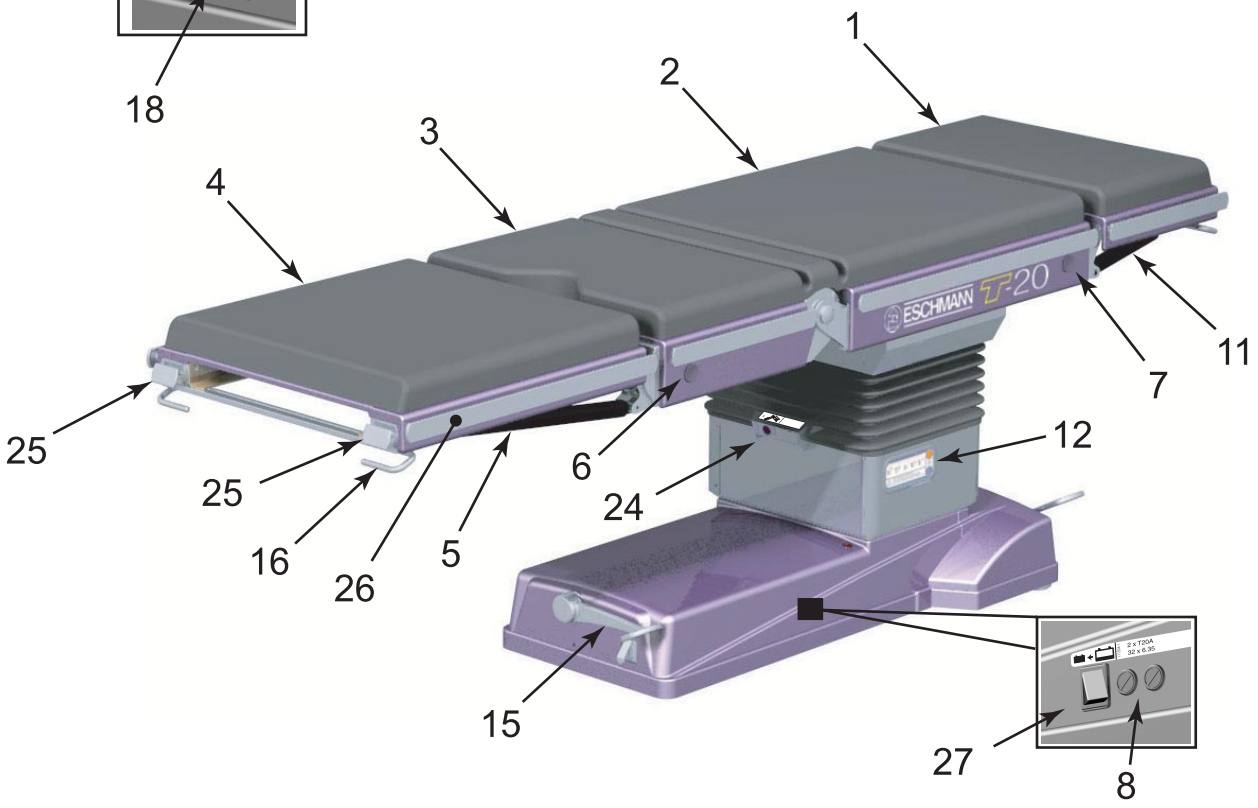


Fig. 1.0 Identification of main parts

Key to Fig. 1.0

1 Head section
2 Long trunk section
3 Short trunk section
4 Leg section
5 Leg section gas spring
6 Short trunk section release button
7 Long trunk section release button
8 Battery fuses
9 Wheel foot pedal
10 Head section release bar
11 Head section gas spring
12 Standby control panel
13 Base
14 Pedestal
15 Castor foot pedal
16 Leg section release bar
17 Mains fuses
18 Connection socket for mains (**ONLY** use Eschmann mains cord, Part No. 391177)
19 Main battery charging state LED:
- Red = Mains 'on', batteries in 'bulk' charge
- Amber = Mains 'on', batteries in 'top-up' charge (duration 2 hours)
- Green = Mains 'on', batteries in 'trickle' charge (i.e. fully charged)

20 Standby battery charging state LED (colour code as main battery above)
21 Main table 'On/Off' switch (◯ = Off, ⊙ = On)
22 Connection socket for Eschmann footswitch (**ONLY**)
23 Table 'On' LED (green)
- Bright = Table in use, micro-controllers active
- Dim = Table ready for instant use but in battery save (sleep) mode

24 Connection socket for Eschmann handset (**ONLY**)
25 Head and leg section end blocks (use to stow UK handset)
26 Accessory side rails (can also be used to stow handset*)
27 Standby battery switch

* Clip on handset must match side rail type, see 'Instructions for Use'.

Note: For location of the Serial Number plate see inside front cover.

2.0 TECHNICAL DATA

2.1 Weights

The nominal weights of the standard table components are listed below (for 50mm mattresses):

Leg section (without mattress)	11.50kg
Leg section mattress	2.75kg
Head section (without mattress)	7.75kg
Head section mattress	2.00kg
Table (base and column only)	192.00kg
Long and short trunk assembly*	55.75kg
Long and short trunk mattress	7.25kg
Total weight standard table	279kg
Lightweight leg section	4.50kg
Footrest (incl. mattress)	7.00kg
Width extender (incl. mattress)	6.00kg
Perineal instrument tray	3.00kg

* (without mattress)

2.2 Dimensions

The following are the nominal major dimensions of the standard table (with head and leg sections fitted) and include the 50mm mattress and side rails if applicable (see Fig. 2.1 for illustration, the number in brackets after the item details which part):

Overall length (2)	2102mm
Maximum height (4)	1120mm*
Minimum height (5)	720mm*
Maximum top traverse (2)	250mm
Overall width (6)	600mm
Sidebars (Denyer)	37.8 x 5.5mm

* 5mm less for Serial Numbers prefixed T2AA or T2AB

2.3 Movements

The following table movements are maximums and cannot be assumed to be available in all combinations of table positioning (see Fig. 2.1 for illustration, the number in brackets after the item details which part). For example, with the table in its normal configuration and at minimum height the maximum Trendelenburg and leg section movements cannot be achieved due to the proximity of the floor. Similarly with a large amount of tilt set, maximum Trendelenburg cannot be achieved.

Max. Trendelenburg (1)	35°
Max. reverse Trendelenburg (1)	35°
Max. extension (4)	230°
Max. flexion (4)	90°
Head section (5)	±45°
Leg section (3)	-100° +55°
Max. lateral tilt (7)	±18°

2.4 Table loading

See maximum patient weight distribution charts in Fig. 2.2 and 2.3 for various table positions and orientations.

Maximum section loading is stated on each item and is detailed below for reference:

Leg section	44kg
Head section	22kg

For accessories the maximum loading is stated on each item and detailed in the User Handbook supplied with them.

For specific notes on the obese patient see the 'Instructions for Use'.

2.5 Electrical

2.5.1 Antistatic requirements

The table has an antistatic pathway from the table top, through an internal resistor, to the castors.

CAUTION

To complete and maintain the antistatic pathway the table must be used on an electrically conductive or antistatic floor and with mattresses supplied by Eschmann Equipment.

2.5.2 Batteries

Table base:

Main batteries**:

Two, 12V 10.0Ah, sealed lead acid

Backup batteries**:

Two, 12V 1.2Ah, sealed lead acid

(see battery disposal caution in the 'Instructions for Use')

Infrared handset:

Two, 1.5V size AA Alkaline (Note: Must only be changed in accordance with the notes in the section 6.6.19.2 to ensure the IP rating is not compromised).

*2.5.3 Internal battery charger***

Input

100-240V a.c. 2.4A (max) 50-60Hz

Output

29.2V d.c. 2A (max.) when charge state LED red or orange, 27.6V d.c. when charge state LED green

2.5.4 Fuses

2.5.4.1 ***External fuses***

Mains input fuses (item 17, Fig. 1.0)

2 x T4A (5 x 20mm) 250V

Battery fuses (item 8, Fig. 1.0)

2 x T20A (6.35 x 32mm) 500V

Note: The right hand fuse is linked to the main batteries and the left hand fuse (i.e. nearest to the backup battery switch) is linked to the backup batteries.

Mains plug fuse

.. .. 10A (type is dependent on plug which may have been changed from that originally supplied)

2.5.4.2 ***Internal fuses**** (only accessible by engineer)

Battery fuses** (joining each battery pair)

2 x 30A blade type* (1 per battery pair)

2.5.5 Duty cycle

This symbol is used to indicate the table's duty cycle which, in the worst case, is '60s : 600s', the ratio of the operating time to the sum of the operating time and the ensuing interval (see note below). Each motor drive has its own duty cycle and this is dependent on loading and table position as detailed below.

Trendelenburg 1 : 4 (60s : 240s) at a maximum torque of 417Nm (e.g. 135kg load offset 31cm from the fulcrum, or a 300kg load offset 14cm from the fulcrum. Where this load is the patient and accessories weight and the offset is how far the loads centre of gravity is, from the centre of the column).

Traverse 1 : 4 (60s : 240s) when the table is horizontal and at the maximum load of 300kg, or at 17.5° with a patient weight of 225kg, or at 35° with a patient weight of 150kg.

Break 1 : 10 (60s : 600s) at maximum patient weight of 300kg.

Height 1 : 4 (60s : 240s) at maximum patient weight of 300kg (not offset).

Tilt 1 : 4 (60s : 240s) at maximum patient weight of 300kg.

Note: The duty cycles above are all for the worst case (i.e. maximum loads). For reduced loading the above duty cycles can be increased.

2.6 Classification and symbology

All the symbols used on this table are shown and explained in the 'Instructions for Use'. These detail the safety category and class of this table as marked on the table or section by the use of these symbols.

2.7 Use in conjunction with other equipment

2.7.1 Electrosurgical equipment (h.f.)

The T20-a operation table has been designed to minimise the possibility of accidental electrosurgery burns and can be used in conjunction with electrosurgical equipment. However, contact with any metal surfaces (e.g. table side bars, or other equipment etc.) can cause burns during electrosurgery and must be avoided.

2.7.2 Defibrillation equipment

With the mains cord attached the equipment has defibrillator proof applied parts with type **BF** protection against electric shock.

2.7.3 Other

When the T20-a is used in conjunction with other infrared controlled devices, their controllers should be checked to ensure that no interference between them and the T20-a is possible, prior to surgical intervention. Also see the 'Instructions for Use'.

2.8 Standards compliance

The table has been designed and built to comply with the following international standards:

BS EN 60601-1: 1990 (issue 2, October 1997)
BS EN 60601-1-2: 1993
BS EN 60601-2-46: 1998
BS EN 60601-1-4: 1997

2.9 Environmental conditions

2.9.1 Operating environment

The table has been designed to operate in the following environment:

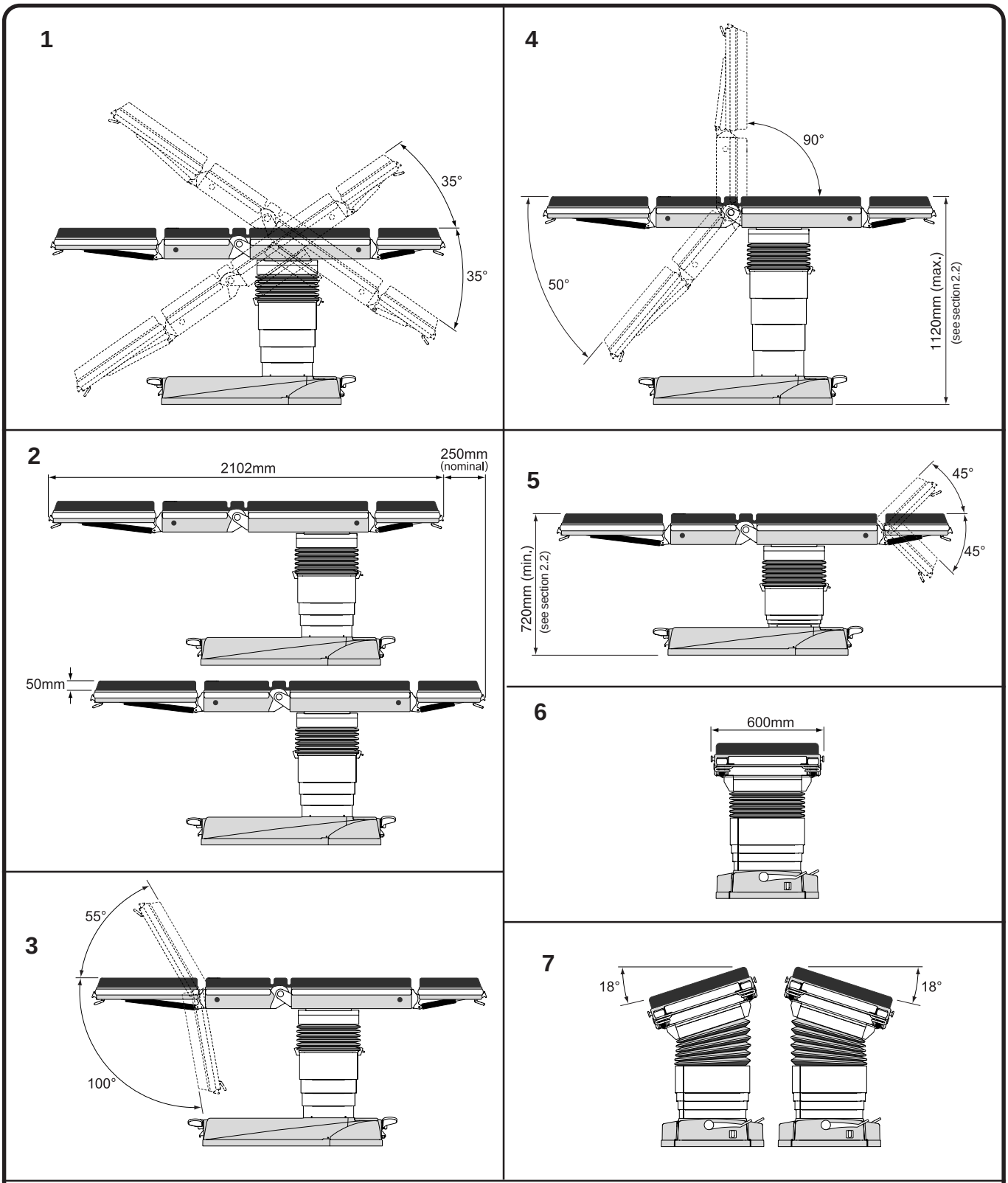
Temperature range	..	..	10°C to +40°C
Pressure range ..	..	..	69KPa to 106KPa.
Humidity range ..	..	..	30% to 75% RH non-condensing.

2.9.2 Transport & storage environment

The table can be transported and stored safely, in the following environment:

Temperature range	..	..	-30°C to +50°C
Pressure range ..	..	..	69KPa to 106KPa
Humidity range ..	..	..	30% to 90% RH non-condensing.

**** NOTE: Items marked ** are to be changed with caution. During change or replacement they must only be disconnected for a maximum of 60 seconds. If battery power is removed from the table for longer than this then reconditioning of the battery management system must be carried out, see section 6.6.26.**

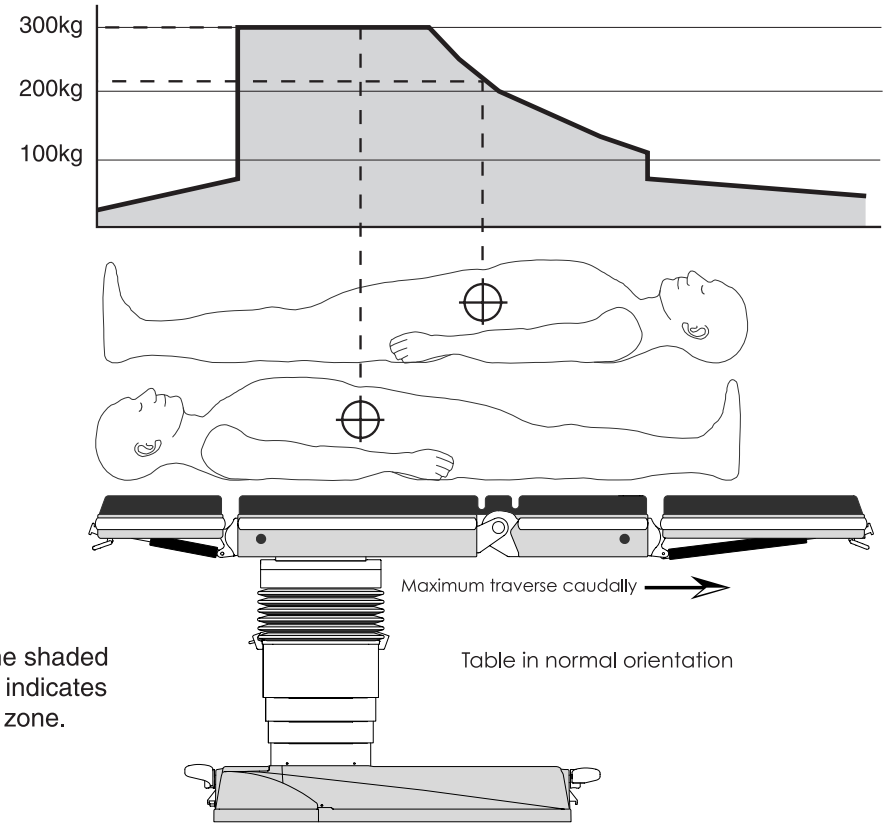


These are maximum movements for each aspect, they may not be available in certain combinations (e.g. maximum tilt and maximum Trendelenburg). Movements that could cause damage cannot be catered for (e.g. position of the leg section).

Fig. 2.1 Major dimensions and movements

The graph indicates the maximum patient weight that can be placed on the table (when adjusted as shown) with their centre of gravity (normally the umbilicas) positioned relative to the table as indicated.
In these examples the maximum patient weight is approximately 300kg and 215kg.

In both graphs the shaded area of the chart indicates the safe working zone.



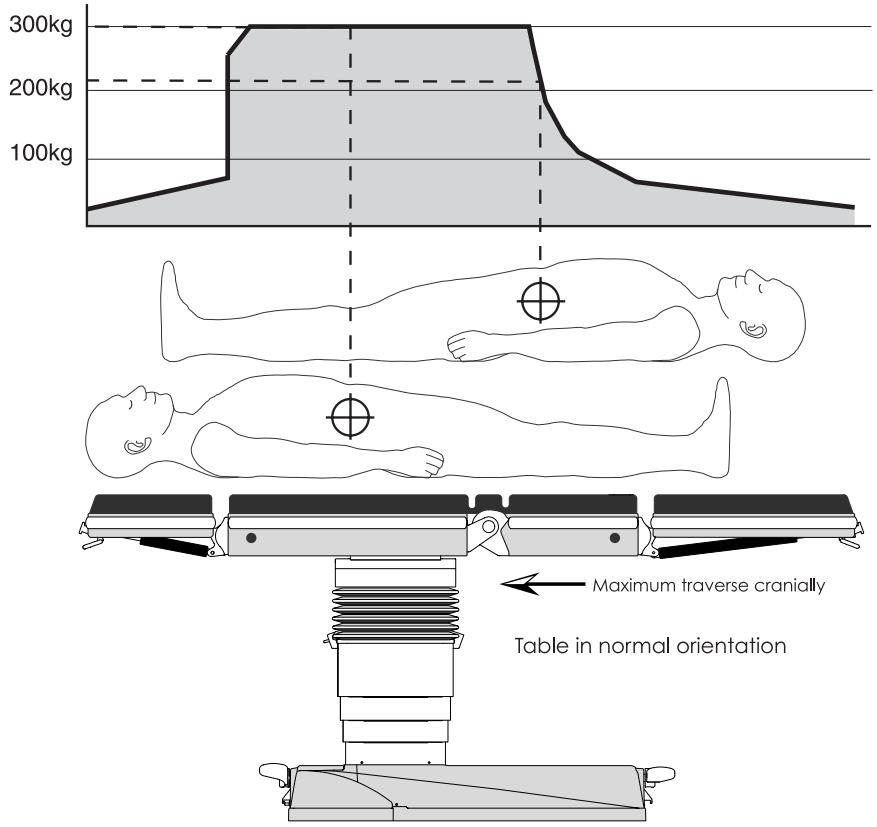
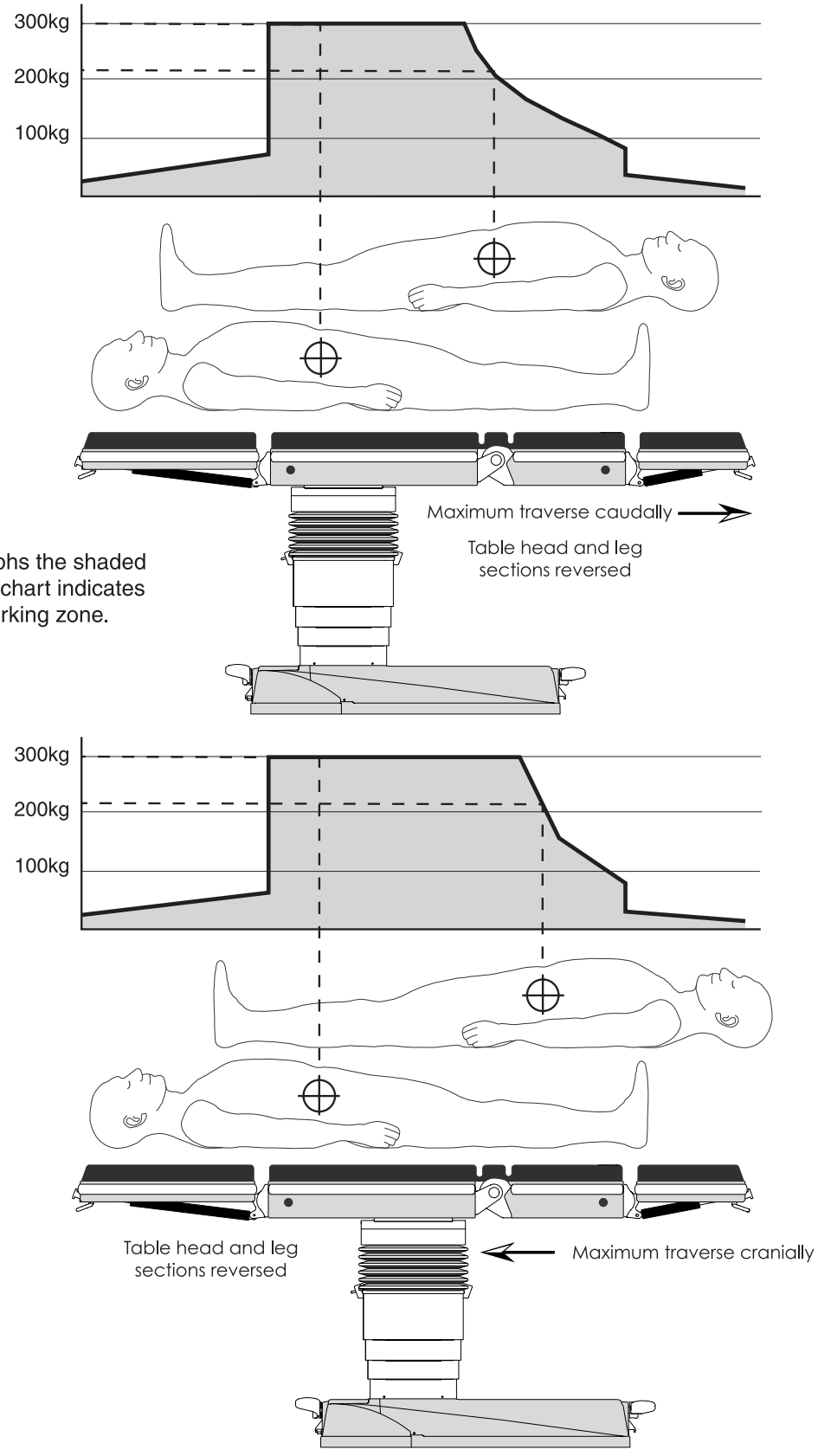


Fig. 2.2 Maximum patient weight v table position graphs

The graph indicates the maximum patient weight that can be placed on the table (when adjusted as shown) with their centre of gravity (normally the umbilicas) positioned relative to the table as indicated.
In these examples the maximum patient weight is approximately 300kg and 215kg.



In both graphs the shaded area of the chart indicates the safe working zone.

Fig. 2.3 Maximum patient weight v table position graphs

3.0 TECHNICAL DESCRIPTION

See Fig. 3.1 and Appendix 3 for schematic diagrams.

3.1 Power supply assembly

This assembly (Part number 111765) which is located in the table base, has no user serviceable parts and must be changed as a complete unit. The assembly includes, a Battery charger loom, a Battery charger module, a Battery management PCA, a Battery connector loom, a Chassis plate, two Battery support brackets, a Switch, two Fuses (32 x 6.35mm 20A 'T' type), two Fuse holders, two battery pairs and all connections, cable ties and screws etc.

3.2 Control electronics

3.2.1 Overview

The control electronics for the T20-a is distributed between two PCA's (the '4 actuator PCA' and the '3 actuator PCA'). These two PCA's contain three distinct microprocessor daughter PCAs (two on the '4 actuator PCA' and one on the '3 actuator PCA').
The '4 actuator PCA' (111524) is located on the column and includes the 'main controller' and the '4 actuator controller'. Each of these 'controllers' consists of a 'microprocessor daughter PCA' (111526) which have their control electronics on the '4 actuator PCA'.
The 'Three actuator PCA' (111525) is located in the long trunk section of the table and contains the '3 actuator controller', another 'microprocessor daughter PCA' (111526) with its control electronics on the 'Three actuator PCA'.

3.2.1.1 Microprocessor daughter PCAs

The daughter PCAs consist of a Motorola MC68HC912B32 micro controller, a watchdog circuit, an RS232 line driver and an SPI UART and RS485 line driver. All the micro controllers on the T20-a require these components. The RS232 communications can be used to provide a telemetry link to custom software running on a PC. Once fitted to their respective controller boards the micro controllers are programmed with the appropriate software application.
There is a 'main controller application' (110442) and an 'actuator controller application' (110443). Both the 4-actuator and 3-actuator are programmed with the same 'actuator controller application' (110443). A configuration file is then downloaded to each micro controller that specifies which controllers are present on which board. It is possible to configure any actuator to any board, however the configuration of the electronics is specific to each actuator.

3.2.1.2 The 'main controller'

The 'main controller' provides the control and supervisory functions for the table. This consists of the interface to the infrared handset, corded handset (via RS232), footswitch and standby panel. It also controls the table power LED.
The main controller communicates with the two actuator controllers (one of which is co-located on the 4 actuator PCA) by means of an RS485 multi-drop bus. This system enables multiple slave controllers to be attached at any time. The main controller issues a health check poll message to each of the actuators (up to four of which can be controlled by the single PCA) to ensure that they are functioning correctly.
When a command is received from any of the user-input devices the main controller issues the appropriate movement commands to the required actuator (or actuator groups in the case of combined movements).

3.2.1.3 The '4 actuator PCA'

The '4 actuator PCA' is responsible for movement of four actuators on or within the table's column. These are the 'top and bottom height actuators' inside the column assembly, the 'Trendelenburg actuator' and the 'Tilt actuator' mounted on the column. A number of signals control the movement of each actuator.
A PWM signal is used to set the speed of the motor; digital signals control direction (forward/reverse), a digital signal enables the drive circuit and another digital signal effects a brake on the motor by shorting the windings together. The electronics provide a digital fault signal to indicate when there is a problem with the control circuit, or an over current situation has occurred. An analogue signal is also provided on all but the 'bottom height actuator'. The analogue signal on the top height actuator is the output from a potentiometer that indicates the combined position of the height actuators. Although the column contains two motors, there is only a single potentiometer to indicate the height of the column. This analogue signal is fed to the 'top height actuator'; the' bottom height actuator' is effectively slaved to the top.

3.2.1.4 The 'Three actuator PCA'

The 'Three actuator PCA' is responsible for movement of the three actuators within the tables long and short trunk sections. These are the 'left break actuator', 'right break actuator' and the 'traverse actuator'. These actuators are controlled by the same signals as on the '4 actuator PCA'. In terms of feedback, both the 'left and right break actuators' have potentiometers and the 'traverse actuator' has limit switches which open when the long trunk reaches either end of its movement. The 'left and right break actuators' are independently controlled to move at a set speed and to maintain a minimum deviation between them.

3.2.2 Handset overview

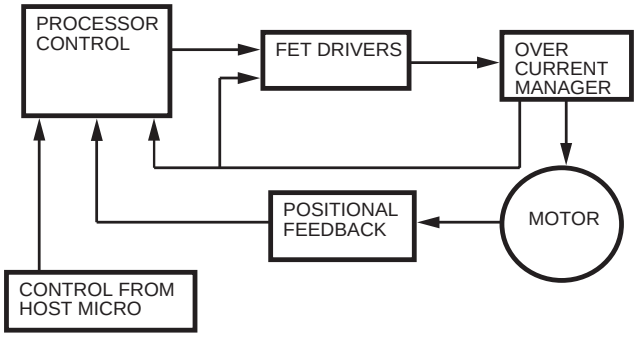
There are two versions of handset, a cordless type (infrared handset) with an infrared emitter powered by 2 AA cells and a corded version (corded handset) with an RS232 link to the main processor on the '4 actuator PCA'. The latter version derives its power from the T20-a.

3.2.2.1 Infrared handset

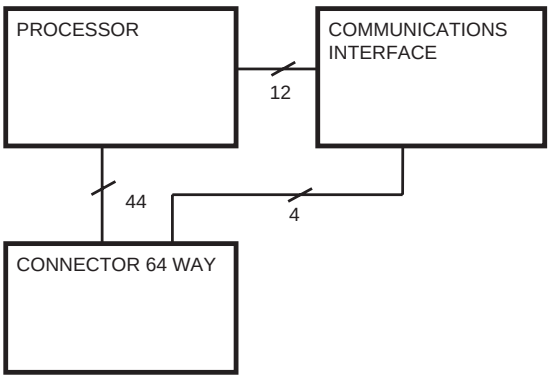
The 4 x 5 matrix keyboard is decoded using a proprietary keyboard decoder. This device is powered down and remains dormant until a key is pressed causing its clock oscillator to be initialised. The key is decoded and the 38kHz modulated signal is fed to the infrared LED via a FET. The whole system is powered via 2 AA batteries

3.2.2.2 Corded handset

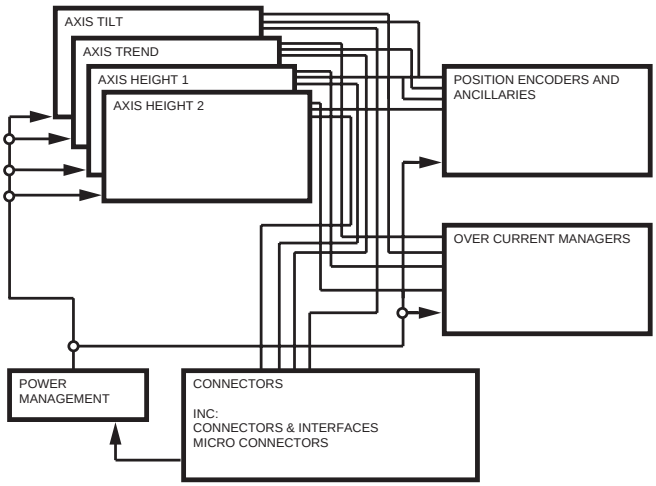
The 4 x 5 matrix keyboard is decoded using a proprietary keyboard decoder. This device is powered down and remains dormant until a key is pressed causing its clock oscillator to be initialised. The key is decoded and the 38kHz modulated signal is fed to a PIC processor. The processor decodes the output from the keyboard decoder into RS232. This output is fed to an RS232 line driver. The corded handset's power is supplied directly from the T20-a, 5V power supply. The handset contains a DC-DC converter to supply 3.3V for the keyboard decoder. There are indicator LED's to show the charge status of the table batteries (main and standby).



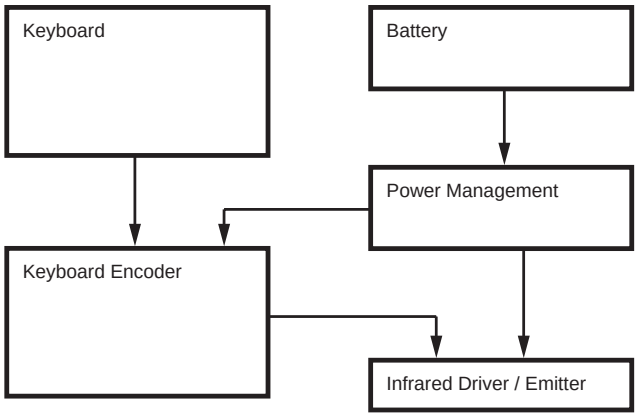
Basic control and feedback - all actuator drivers



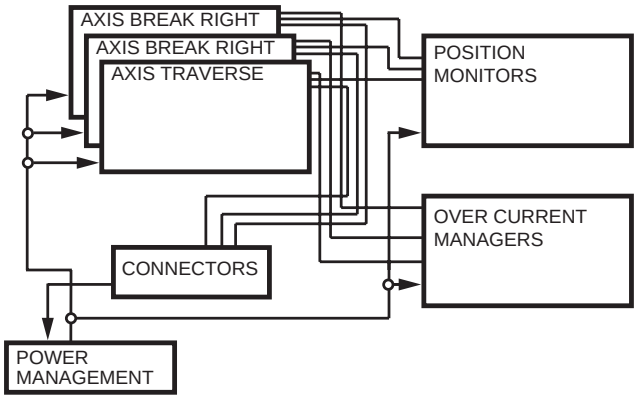
Processor PCA



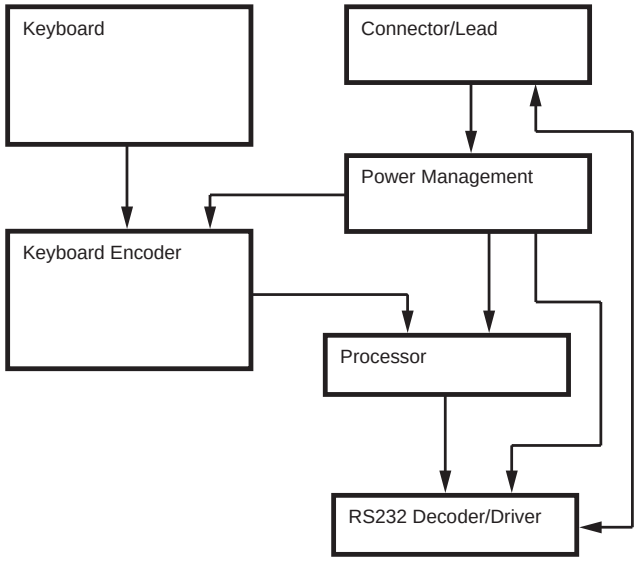
Four Actuator PCA



Handset remote version



Three actuator PCA



Handset corded version

Fig. 3.1 Schematic diagrams

4.0 SAFETY WARNINGS

4.1 'Service position'

When the four M10 screws (each side) that secure the trunk sections to the pedestal are removed, to place the table in the 'Service position' as detailed in section 1.9, always take extreme care (and ensure table is switched 'off' before tilting top into or out off the 'Service position'). When the M10 screws are removed the table trunk sections may tilt dramatically unless the sections are fully supported during screw removal. Always lower the trunk sections into (and out of) the 'Service position' slowly and always return the table trunk sections to the 'normal' position (taking care not to trap fingers) as soon as possible, replacing the eight M10 screws securely. Also remove the following before placing the table into the 'Service position':

Head section	Leg section
Trunk mattress	All accessories

When powering the table in the 'Service position' using tool T2203 (to connect the table top connector blocks) extreme care should be taken and powering the table in this position should be limited to essential testing only. It is preferable to return the table out of the 'Service position' before powering the table.

4.2 Lifting

During some of the procedures detailed in this manual it is necessary to lift heavy assemblies. These are the long and short trunk assembly, the wraproud assembly and the telescopic assembly. These all require two people to lift safely and any procedure that requires these to be removed from the table should not be attempted if two people are not available. Other components although not heavy enough to require two people, should be handled using the correct lifting techniques to minimise personnel injury. It is advised that suitable protective footwear is worn when handling heavy parts.

4.3 M10 trunk screw removal

When removing the four M10 (hexagonal head) screws that secure the trunk sections to the column, always ensure that precautions similar to those detailed in 4.1 above are taken. Remove all accessories, sections and trunk mattress and support the trunk sections during screw removal.

4.4 Trend and tilt actuator removal

When the Trend and /or tilt actuators are removed the trunk sections will not be stable. Before removal follow similar precautions to those detailed in section 4.1. Remove all accessories, sections and trunk mattress and support the trunk sections during actuator removal. Replace the actuator as soon as possible.

4.5 Working with mains voltage

The only time that it may be required to work with mains voltage applied to the table is whilst testing the battery charger. During this procedure ensure that normal safe working procedures are employed for an activity that entails working with mains voltage, such as:

i Reduce the amount of live work to the minimum possible.

ii Use common sense and stop working if approached, distractions can kill.

iii Ensure the area is clear of all unnecessary personnel or warn people in the area to stay clear during live work. Also ensure that you are not entirely alone and that someone could come to your assistance if you should suffer an electric shock.

iv Only use the correct equipment, probes and cables for the work in hand.

v Mains power should be supplied via an RCD (residual current device).

vi Turn off the mains power whenever possible to reduce risks.

4.6 Gas springs

When removing or servicing the table head and leg sections gas springs refer to the warning in section 6.5.1.2. They do not require lubrication and do not attempt to open them. Also note the disposal notes provided in 6.5.1.2 (vii).

4.7 Hot parts on PCAs

During service and when covers are removed note that parts of the PCAs can become hot enough to cause burns. Beware that touching these assemblies when hot could result in unexpected body movements.

4.8 Biological contamination

During servicing of the table it is advised that protective gloves should be warn to avoid biological contamination. It is preferable that the table be cleaned and disinfected before service.

4.9 Connection of leads

When connecting test leads to the table during service ensure that these do not constitute a tripping hazard.

4.10 Leaking batteries

In the unlikely event of a battery leaking in the table base avoid spreading the contamination (sulphuric acid) and:

i Wear suitable personnel protection (goggles, gloves etc.) do not smoke and avoid sparks.

ii Use a bonding agent such as sand, or sodium carbonate to absorb and neutralise the bulk of the electrolyte. Wash (and rinse well) the contaminated area with water, taking care not to splash electronics or any other table base components.

iii Do not flush electrolyte into the sewer system but dispose of the used bonding agent and all cleaning materials in accordance with local waste regulations.

In the case of skin contact wash and rinse immediately with water. If splashed into eyes rinse well with water and seek medical advice. If acid mist is inhaled, inhale fresh air and seek medical advice.

5.0 MAINTENANCE

5.1 Power supply assembly

This assembly (Part number 111765) which is located in the table base, has no user serviceable parts and must be changed as a complete unit (also see section 3.1).

5.2 Table fault finding

5.2.1 The 'Instructions for use' contains a basic fault finding table that can be used to solve any minor problems. This covers the main user errors (i.e. there is no fault) that can occur when the user has not read and understood the 'Instructions for use'. It also contains the first line of fault finding (i.e. check external fuses, try another handset, try another mains lead). The following section (5.2.2) provides a test sequence to help determine the fault (for the majority of faults that may occur) that could stop the table responding to an input via a control device. Mechanical faults are normally self evident in that a part is worn, damaged or broken. In this case refer to the appropriate section of this manual for part replacement information. Appendix 3 provides the schematic diagrammes that can also be used in fault finding.

5.2.2 Follow the sequence below to identify most major faults that result in a lack of response to a control command:

1 When the table is initially switched 'on' is the table 'on' LED (item 23 of Fig. 1.0) bright, dull or 'off' for the first few seconds.

If dull turn the table 'off' wait at least 10 seconds and then turn back on. If the LED is still dull or 'off' this indicates an electronics fault see 5.2.3.

If bright move to 2 below.

If it is flashing this also indicates an electronics fault see 5.2.3.

2 Try the 'standby control panel' (any motion except Trendelenburg), if this fails try the 'standby control panel' with the backup battery switch depressed.

If the table works from the 'standby control panel' this indicates a fault with the control device or its connection to the table.

If the table works from the 'standby control panel' only when the backup battery switch is pressed this indicates a fault with the main batteries (replace the whole Power supply unit).

Now try Trendelenburg from the 'standby control panel', if this and only this motion works it indicates a problem with the main control PCA.

3 If one of the motor groups 'only' has failed then this indicates a problem with its associated PCA as follows:

Break and traverse - Three actuator PCA

Tilt, Trend and Height - 4 Actuator PCA

This distinction may help in reducing the amount of diagnostics and cover removal.

4 Remove covers and check battery fuses **(see section 5.3.1 and 6.6.26)**. Also look to see if the PCA indicator lights are flashing 'on' for 1 second and 'off' for 1 second. If they are 'off' or flashing faster, this indicates an electronics fault see 5.2.3.

5 If the fault is only apparent for one motion this could indicate a failed motor or failed sensor for that motion, or, an electronics fault. If the motion starts and then stops immediately this could indicate a failed sensor or an over current situation. Test motor (as detailed in section 6.6), if the motor works and no small movement is observed following a demand for that motion, it indicates an electronics fault, see 5.2.3.

5.2.3 Electronic faults can only be determined with the table connected to a PC with the 'T20 Application Software' installed. Consult the Application Software Manual (as detailed in section 1.1) which provides guidance on fault diagnosis. Also note that when correcting electronic faults (and following some parts replacement) the table will require reprogramming, reconfiguring or recalibration. These aspects are also fully covered in the Application Software Manual.

5.2.4 Break motion control

5.2.4.1 The two break arms are independently controlled and are synchronised to operate within a programmed limit of each other. This control system can result in small variances that appear as a slight misalignment, this is acceptable and a part of the normal table control software routine. In the unlikely event that this deviation goes outside of the programmed limit the table break motion (only) will stop working. This can sometimes be corrected as below.

5.2.4.2 Whilst observing the two break arms press (for approximately 0.5 seconds only) a break control button on the handset (B7 or B8 of Fig. 6.9) once or twice. If this makes the deviation worse press the other break control button as above once or twice. If the break motion still does not work correctly after this there could be a fault in one of the following:

Break motor

Break potentiometer

Wiring to any of the above

Significant uneven table loading*

*This problem will only be evident during use and if investigated at service it will be difficult to reproduce.

5.2.5 Trunk section connector blocks

5.2.5.1 If all the top table functions stop working (e.g. break and traverse) the connector blocks (item 5, Fig. 6.7 and item 14, Fig 6.3) could be failing to connect correctly due to contamination etc. Check that a good contact is being made between the column and trunks connector blocks.

5.3 Fuse location

5.3.1 All fuse locations are identified in section 2.5.4 and Fig. 1.0. **DO NOT REMOVE OR CHANGE INLINE BATTERY FUSES UNLESS YOU HAVE READ SECTION 6.6.26.**

5.4 Service schedule and safety check

This should be performed every 6 months to ensure the continued safe operation of the table.

NOTES:

1. The numbers in brackets in this schedule details the section of this manual that should be referred to when performing or checking the activity detailed.
2. Prior to service operate all table functions (6.7) to ensure correct operation, note any problems for investigation during the service.
3. Remove base covers as required (6.2.2.1). Access can be gained to the lower, lower-mid, upper-mid and top of the column (6.2.3.2 to 6.2.3.5). If necessary the telescopic covers can be removed (6.2.4.1).
4. Prior to changing a motor check it has failed and that the fault is not in the control electronics (6.6.6 - 6.6.9).
5. In the sections below where the word 'check' is used it is inferred that if the check reveals a fault then this should be corrected.
6. Tilt tabletop into service position as required (1.9) but note safety warning, section 4.1.
7. The right-hand column should be used to tick off each item of the schedule on completion and to note parts replaced (or wearing that will soon need replacing).
8. This schedule should be photocopied and completed, copies to be retained by the engineer conducting the service and the person responsible for the table.

Base and column:

1. Check pedal dampers for wear or leaking (6.3.3).	
2. Disassemble, clean and lubricate the two fixed wheel assemblies and the four castor assemblies (6.3.4, 6.3.5). Test resistor assembly as 6.3.5.1 (viii).	
3. Check brake pads for wear, damage, or hard and brittle (6.3.6).	
4. Check the castor pillar and pedal spindle bushes for wear (6.3.7 and 6.3.8).	
5. Check and lubricate both lifting roller assemblies (6.3.9).	
6. Check for wear of both pedal catch mechanisms (6.3.12) and renew the anti-slip pad on both pedals (6.3.11).	
7. Check security of all fixing screws, nuts and retaining clips within the base area and check the pedal operation works smoothly and correctly.	
8. Check main and standby battery voltage (standby and load) as 6.3.2.(iia). Check security, connectors and loom routing of PSU.	
9. Check the Trendelenburg, tilt and telescopic column actuator assemblies for excessive wear or failure (6.4.2, 6.4.3, 6.4.4 and 6.4.5) and grease worm and wheel on Trendelenburg and tilt motor assemblies.	
10. Check the security and positioning of all wiring looms and connections. Add cable ties, reposition or replace as necessary.	
11. Check switch and fuse panels for operation and signs of damage (6.6.16).	
12. Check for wear or damage to the tilt and Trendelenburg bushes in the trend and tilt frame (6.4.6 and 6.4.7). Check all fixing screws within the inner and outer (tilt and Trend) gimbal assemblies.	
13. Check the wraparound aligning bearing pads, adjust as required to remove play or replace (6.4.8).	
14. Check height potentiometer is secure to the wrapround and that the cable is in good condition and secure to the base (6.6.13).	
15. Check the security and the routing of the 4 actuator PCA, connectors, energy chains and all looms within the column. Cable-tie if necessary	
16. Remove and replace bellows if split/damaged (6.2.5).	
17. Check the security and the routing of the Three actuator PCA, connectors, energy chains and traverse and break motor looms within the traverse housing. Cable-tie if necessary.	
18. Check that traverse motor and traverse belt tensioners are secure to the support plate and lubricate tensioner bearings between screw and bearing only. Check traverse motor (6.5.2.1) and adjustment of the traverse belt tensioners' (6.5.2.2).	
19. Check the condition and lubricate if necessary the drive belt guide needle bearings between screw and bearing only (6.5.2.9).	

Trunk sections and covers.

20. Check condition (excessive wear/breakage) of traverse rod bearings (6.5.2.8).	
21. Check operation and adjustment of the traverse limit switch assemblies' (6.6.14). NOTE: Check that the traverse movement stops when the traverse limit switch pin is depressed from both ends and from both sides of the table.	
22. Check that the set screws that retain the traverse leadscrews are tight (20Nm) and lubricate the lead screw and traverse rod.	
23. Clean the male and female pins on the 4-way communication connector block to ensure a good contact, check for cracks or damage (6.6.15).	
24. Remove long / short trunk push button assemblies, clean and check condition of catch blade (6.5.2.7), do not lubricate.	
25. Check guide pin holes (in the attachment blocks) for excessive wear (6.5.2.10)	
26. Checks for equal and even movement of the two break motors (i.e. check both break arms in the short trunk move up and down together). If required, replace, adjust or recalibrate (6.5.2.3 and 6.5.2.4).	
27. Service infrared handset (6.6.23). Check function and condition of corded handset.	
28. Check that all side rail fixing screws are tight in the long and short trunk sections (21Nm) and the head and leg sections (15Nm).	
29. Check the condition of the trunk section covers (6.5.2.6 and 6.5.1.3).	
30. Ensure tabletop is not in the service position and the locking screws are replaced to lock the trunk sections out of the service position.	
31. Ensure free movement of the telescopic covers. Check condition and function of Standby control panel, replace if adhesion to column cover shows any sign of failure (6.6.25).	
32. Ensure the base covers are refitted (6.2.2.2).	
33. Conduct the function tests (6.7) correct any faults and conduct the function tests again until all functions are working correctly.	

Head and leg sections.

34. Check all guide pins for wear or damage (6.5.1.1).	
35. Check gas springs for leaks or poor performance (6.5.1.2).	
36. Check gas spring pivot pins and shoulder screws for security and wear (6.5.1.4)	
36. Check the condition of the head and leg section covers (6.5.2.6 and 6.5.1.3).	

Ensure the 'Electrical safety checks' have been carried out (see Appendix 4 of the 'Service Manual'). Leave table clean and in a fully functioning condition with batteries on charge and table switched off.

Service / Table details

Service Engineer

Engineers Name (Eschmann / Hospital*) ..... Contact Tel. No. .....

Person responsible for table

Name ..... Position ..... Dept. .....

Hospital ..... Health Authority ..... Tel.No. .....

Table details

Table SN ..... Location ..... Account No. (If appl.) .....

Service detail

Date ..... Time completed ..... 2nd visit reqd. YES /NO*

(* Delete as required)

6.0 PART REMOVAL/ADJUSTMENT/ REPLACEMENT

6.1 GENERAL

6.1.1 This section has been split into the following sections for easy reference, note safety warnings in section 4.0:

6.2 Table base and column covers
6.3 Table base components
6.4 Table column components
6.5 Table sections
6.6 Electrical components
6.7 Function tests after maintenance
6.8 Accessories

6.1.2 Within the text detailing a part replacement any specific setting or adjustment is fully detailed. Each section also provides specific details of any required lubrication during assembly, the use of threadlock fluids and any specific torque settings that should be adhered to.
Note: Conversion chart and conversion data for Torque values in Appendix 1.

6.1.3 All replacement parts **must** be supplied by Eschmann and note that this also includes **all** the nuts, screws, roll pins, pivot pins etc. that are specified in the 'Illustrated parts list'. Some of these are provided to a specific standard (e.g. high tensile) and the use of 'similar' items could compromise the strength and therefore the safety of the table.

6.1.4 All electrical components are **non-repairable** and must be replaced with new Eschmann parts **only**, to maintain the safety of the system. Replacement is usually a self-evident procedure but ensure :

i Good wiring practice is observed and static discharge procedures are adopted as applicable when handling PCAs (printed circuit assemblies).

ii All wiring is replaced as found and secured away from any moving parts using adequate quantities of cable clips and restraints.

iii All fixings are replaced as found and no substitutes are used.

iv The function checks detailed in this manual (section 6.7) are carried out on completion of any part replacement.

6.1.5 After all procedures the table should be left clean and in full working order (run function test detailed in 6.7) to ensure safety and ensure the (Electrical safety checks) in Appendix 4.

6.1.6 Before any part removal/replacement procedure ensure the table is not connected to the mains. If mains power is required at any time during diagnostic checks ensure that appropriate safe working procedures for live working are adopted (see section 4.5).

6.1.7 To avoid duplication of common procedures a cross reference to the required part of the manual detailing the procedure is provided where required. Note these sections also contain assembly notes that must be followed.

6.1.8 All part numbers can be found in the Illustrated parts list (Publication number T-IPL35 available from Eschmann Equipment at the address on the inside of the front cover). This Illustrated parts list should be available for reference during part removal or replacement.

6.1.9 The locking catch for foot pedals can be external or internal. Please check which type is fitted to the table and follow the appropriate notes in the sections that follow. The external catch is shown in Fig. 6.2a, item 20 and the internal catch is shown in Fig. 6.2b, item 6.

5.1.9 Tables with a Serial Number prefix T2AC or later have been increased in height by 5mm. Check that the correct parts are fitted by referring to the Illustrated parts list. Fig. 6.2b and Fig. 6.2c shown both configurations.

6.2 TABLE BASE & COLUMN COVERS

6.2.1 The removal, replacement and method of gaining access behind the table covers, has been split into the following sections for easy reference:

6.2.2 Base covers.
6.2.3 Access to column.
6.2.4 Telescopic covers.
6.2.5 Bellows.

For reference Fig. 6.1 shows the general arrangement of all the cover components.

6.2.2 Base covers

CAUTION

Ensure the cable to <u>both</u> of the infrared PCA's are released before sliding the base covers away from the base, see 'v' below.

<u>6.2.2.1 Removal of base covers.</u>

i Raise the height of the tabletop sufficiently to expose the screws at the lower edge of the lowest telescopic section where it joins the base covers.

ii Remove both foot pedals by releasing their retaining screws, taking care not to loose the return spring (spring only fitted if the pedal has an external catch).

iii Remove the button head screw from the end of the long base cover and the countersunk screw from both sides of the covers where they join at their lower edge.

iv Remove the two screws from the lower edge of each side of the lowest telescopic cover (not the end face screws).
Note: These screws differ in length and must be put back as found (short 12mm to short trunk end, long 15mm to long trunk end).

v Raise the telescopic covers sufficiently to clear the base covers and slide the base covers away from the pedestal column taking care to release the cable connected to the infrared receiver PCA fitted below each base cover section. The cable plug is released by pressing the moulded release catch.

vi Continue to slide the base covers away from the table until clear and place them safe until replaced.

6.2.2.2 Replacing base covers.

i Slide the base covers into a suitable position to enable the two infrared receiver leads to be reconnected to the PCA fitted to each cover section, ensuring the plug snaps into place correctly. Check both the receivers are working by covering each in turn and send a control command via an infrared handset.

ii Raise the telescopic cover sufficiently to enable the covers to be correctly positioned and aligned.

iii Replace all the fixing screws (without threadlock) and the earth equalization pin using threadlock (part number 670650).

iv Replace and secure the foot pedals (see note below) ensuring they are placed at their correct ends (long pedal at head end) with the internal return spring in place (spring only fitted if the pedal has an external catch). Use threadlock (part number 670650) on both screws.
Note: When replacing the foot pedal shoulder screw (on pedals with internal spring return) initially tighten with fingers to ensure that the shoulder of the screw has correctly located into the hole in the shaft.

v Test table base functions.

6.2.3 Access to column.

6.2.3.1 Access can be gained behind the column covers in four ways. Either, release the bottom of the telescopic covers and lift them to gain access to the lower column (see section 6.2.3.2), or release the top of the telescopic covers and lower them to gain access to the lower-mid column (see section 6.2.3.3), or release the bottom of the bellows and raise them to gain access to the upper-mid column (see section 6.2.3.4), or release the top of the bellows and lower them to gain access to the top of the column (see section 6.2.3.5).

6.2.3.2 Lower column access

i Raise the height of the tabletop as far as possible, this will ensure maximum access and expose the screws at the lower edge of the lowest telescopic section where it joins the base covers.

ii Remove the two screws from the lower edge of each side of the lowest telescopic cover (not the end face screws).
Note: These screws differ in length and must be put back as found (short 12mm to short trunk end, long 15mm to long trunk end).

iii Raise the telescopic covers to gain access to the lower part of the column.

iv On completion of work on the lower column replace the four lower retaining screws to secure the telescopic covers to the base.

v Test that the telescopic covers function correctly by powering the table between maximum and minimum height several times.

6.2.3.3 Lower-mid column access

CAUTION

Ensure the cable to the standby control panel and the earth wire is released before lowering the telescopic covers, see 'iii' and 'iv' below.

i Remove fourteen plastic rivets (see inset of Fig. 6.1 for details) around the lower edge of the bellows.

ii Lift the bellows to the left and right of the accessory and switch panels (items 8 and 9 of Fig. 6.1) and remove the four screws securing the top edge of the upper telescopic cover to the telescopic cover support brackets (item 6 of Fig. 6.1).

iii Lower the telescopic covers slowly until sufficient access has been gained behind them to allow disconnection of the ribbon cable from the standby control panel where it connects onto the column PCA.

iv Continue to lower the telescopic covers and if required (i.e. if table is near maximum height) disconnect the earth wire from the middle telescopic cover where it is connected to the wrap round.

v On completion of work on the lower-mid column, replace the column covers in the reverse of the sequence above, check the electrical connections have been made correctly during assembly. Use threadlock (part number 670650) on all screws.

vi Test the telescopic covers and standby panel function correctly by powering table between maximum and minimum height several times and testing other standby buttons.

6.2.3.4 Upper-mid column access

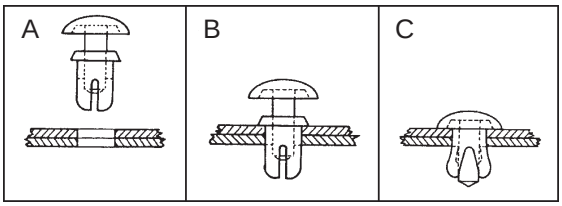
i Remove fourteen plastic rivets (see inset of Fig. 6.1 for details) around the lower edge of the bellows.

ii Lift the bellows to the left and right of the accessory and switch panels (items 8 and 9 of Fig. 6.1) and remove the two screws securing each switch panel retainer (item 7 of Fig. 6.1) to the telescopic cover support brackets (item 6 of Fig. 6.1).

iii The bellows can now be raised but take care not to lift then too far without disconnecting the loom connections from the switch panels where they connect to the column PCA.

iv On completion of work on the upper-mid column, replace the column covers in the reverse of above sequence, check that the electrical connections have been remade correctly during assembly. Use threadlock (part number 670650) on all screws.

Bellows rivet removal/replacement detail

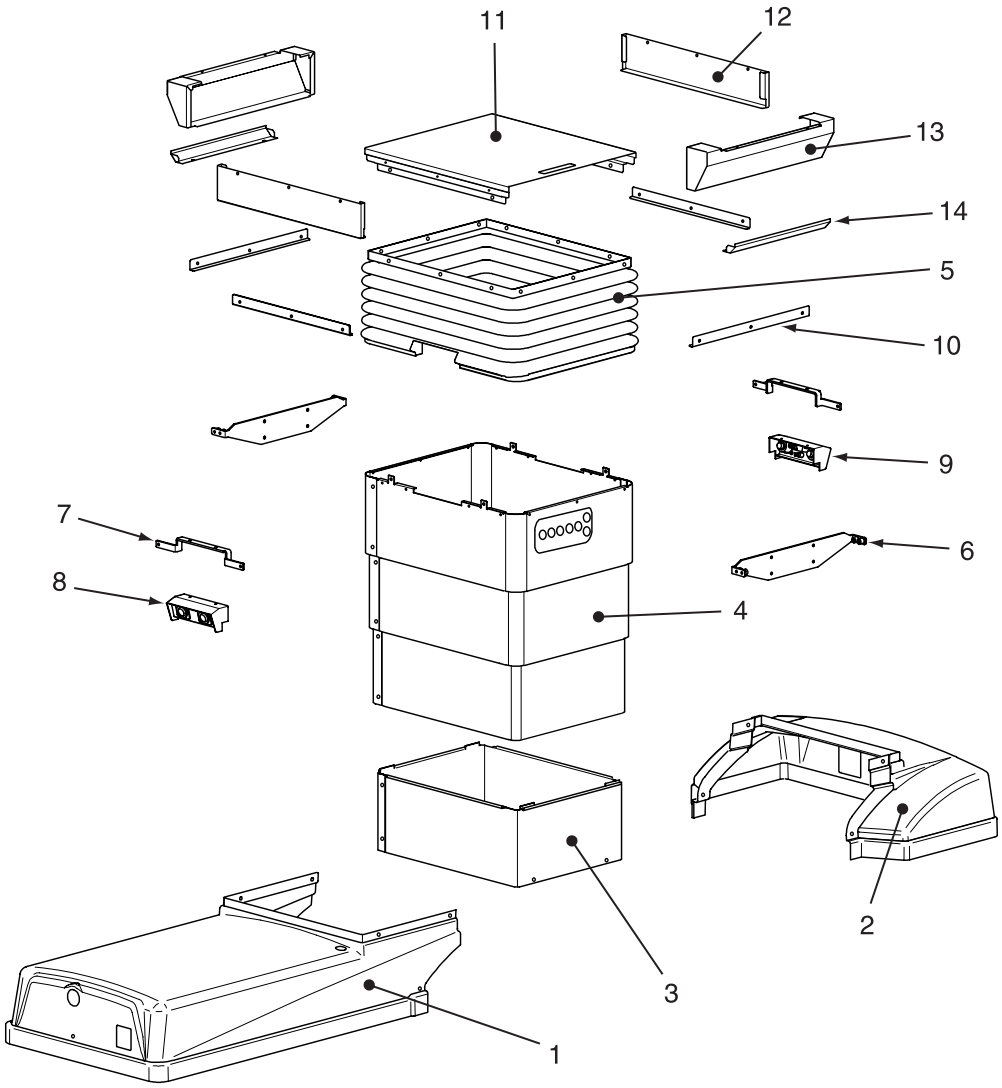


To remove rivets :

a) Pull up plunger head (see B), do not damage rivet head.
b) Pull rivet out of cover (see A).

To replace rivets :

a) Align holes in cover sections (see A).
b) Place rivet in hole so that shoulder of rivet shaft is flush with outer cover face (see B).
c) Press rivet plunger head until flush (see C).



1 Base cover, front
2 Base cover, rear
3 Upstand assembly
4 Telescopic cover assembly
5 Bellows
6 Telescopic cover support bracket (2)
7 Switch panel retainer (2)
8 Accessory panel and loom
9 Switch panel and loom
10 Bellows retainer, top (4)
11 Top of column cover
12 Top of column end cover (2)
13 Top of column side cover (2)
14 Cover, crossbeam side (2)

Fig. 6.1 Table covers general arrangement

v Test that the bellows work correctly by moving table through several complete sequences of extreme tilt and Trendelenburg (use handset not standby panel).

6.2.3.5 Top of column access

i Remove the steel covers (items 12, 13 and 14 of Fig. 6.1) surrounding the top of the bellows (two screws per side cover, three screws per end cover).

ii Remove twelve screws holding the four top bellow clamping strips (item 10 of Fig. 6.1) in place. This will release the top of the bellows allowing them to be lowered gaining access to the top of the column.

iii On completion of work on the top of the column, replacing the bellows and steel covers in the reverse of the sequence above, checking that the bellows have been correctly positioned in their top and bottom clamps. Use threadlock (part number 670650) on all screws.

vii Test that the bellows work correctly by moving table through several complete sequences of extreme tilt and Trendelenburg movements (use handset not standby panel).

6.2.4 Telescopic covers

6.2.4.1 Removal of telescopic covers

CAUTION

Ensure the ribbon cable from the standby control panel and the earth wire are released during removal of covers, see 'v and vii' below.

To remove the telescopic covers completely from the column proceed as follows, but note that access to the column can be gained by releasing the telescopic covers not removing them (see sections 6.2.3.2 and 6.2.3.3):

i Raise the height of the tabletop sufficiently to expose the screws at the lower edge of the lowest telescopic section where it joins the base covers.

ii Remove the two screws from lower edge of each side of the lowest telescopic cover (not the end face screws). See note in 6.2.3.2 (ii).

iii Remove fourteen plastic rivets (see inset of Fig. 6.1 for details) around the lower edge of the bellows.

iv Lift the bellows to the left and right of the accessory and switch panels (items 8 and 9 of Fig. 6.1) and remove the four screws securing the top edge of the upper telescopic cover to the telescopic cover support brackets (item 6 of Fig. 6.1).

v Lower the telescopic covers slowly until sufficient access has been gained behind them to allow disconnection of the standby control panel ribbon cable from its connection on the column PCA.

vi Continue to lower the telescopic covers and disconnect the earth wire from the middle telescopic cover where it is connected to the wrap round.

vii Remove the four screws (two per join) holding the top telescopic section together and remove the section. Continue removing the top telescopic section (disconnecting the earth link as required) until all sections have been removed. Note orientation of parts for later assembly.

6.2.4.2 Refitting the telescopic covers

i Ensure the plastic scratch and noise reducers are in place on the lower and upper edges of each telescopic section before starting to refit them.

ii Refit the covers by reversing the removal sequence detailed above, checking that the earth connections and the standby control panel are reconnected. Use threadlock (part number 670650) on all screws.

iii On completion, test that the telescopic covers move correctly, by powering tabletop (use handset not standby panel) up and down from minimum to maximum several times. Check bellows work correctly by moving table through several complete sequences of extreme tilt and Trendelenburg movements. Then check all the functions of the standby panel

6.2.5 Bellows

WARNING

Removal and replacement of the bellows entails removal of the trunk sections, which are heavy and require two people to lift safely.

6.2.5.1 Removal of the bellows

To remove the bellows completely proceed as follows, but note that access to the column can be gained by releasing the telescopic covers and bellows without removing them (as detailed in section 6.2.3):

i Remove as much as possible from the tabletop including all sections fitted to the two trunk sections and the mattress.

ii Release the top of the bellows as detailed in section 6.2.3.5, points 'i-ii'.

iii Release the bottom of the bellows as detailed in section 6.2.3.4, points 'i-ii'.

iv Reach inside the bellows and remove the four screws (two per panel) securing the switch panel retainers (item 7 of Fig. 6.1) to the accessory panel and the switch panel (items 8 and 9 of Fig. 6.1). The switch panel retainers can now be removed.

v Remove the trunk sections (see note below) together with the traversing and break mechanisms by removing the four screws that secure this assembly to the top of the pedestal (two M10 hexagonal head screws underneath each side). Carefully place the trunk sections to one side, leaving them in a stable position not resting on any fragile components.

Note: The trunk sections may become unstable when the M10 screws are removed and extreme care should be taken. Ensure trunks sections are supported during removal of these screws.

vi Remove the two top location angles (item 15 of Fig. 6.3) and carefully remove the bellows by lifting them up and off the top of the column.

6.2.5.2 Replacing the bellows

Replace the bellows by reversing the removal sequence ensuring that the trunk sections are replaced in the correct orientation (short trunk section at leg end). Note that the four M10 fixings screws should be tightened to a torque setting of 48Nm. Also ensure that the sprung electrical contact pins on the underside of the long trunk section are not damaged, use threadlock (part number 670650) on all screws (except those securing the switch panel and the accessory panel). Check that the bellows have been correctly positioned in their top and bottom retainers and that they work correctly by moving table (use handset not standby panel) through several complete sequences of extreme tilt and Trendelenburg movements. Test that the telescopic covers move correctly, by powering the tabletop up and down from minimum to maximum several times.

6.3 TABLE BASE COMPONENTS

6.3.1 The following parts on the table base may need replacement in the event of wear, damage, or malfunction, (see notes in each section) for the Power supply assembly see section 6.6.5. The procedures for these are detailed in the following sections:

6.3.2 Batteries
6.3.3 Pedal dampers
6.3.4 Front wheels
6.3.5 Castors
6.3.6 Brake pads
6.3.7 Castor pillar bushes
6.3.8 Pedal spindle bushes
6.3.9 Lifting roller assembly
6.3.10 Pedal catch block
6.3.11 Pedal anti-skid pads
6.3.12 Pedal catch pawl and spring

Fig. 6.2a shows the general arrangement for a table with external pedal catches and Fig. 6.2b and Fig. 6.2c show the general arrangement for a table with internal pedal catches (Fig. 6.2c shows the new base arrangement for tables having a Serial number prefix of T2AC or later). These figures identify the main parts of the table base assembly, refer to them as required. Ensure you refer to the correct instructions according to the type of pedal catch fitted to the table (also see section 6.1.9) and base arragemnet according to table height. Always ensure the correct parts are used during part replacement, refer to the illustrated Parts list.

6.3.2 Batteries

IMPORTANT NOTE:

See section 6.6.26 (battery management system reconditioning) before changing the batteries.

i Check fuses in the event of power failure before replacing batteries **(before removing or replacing either battery inline fuse see section 6.6.26)**.

ii Ensure the table is switched 'off' at the main column switch. If batteries are suspect do not change a them unless they are obviously faulty using the following notes as a guide.

a) The fully charged (single) battery voltage should be at least 12.5V (or a series voltage of 25-27.5V per pair) and a series voltage of between 23.5V and 25.5V when powering the tilt motor (table not loaded). To test the standby batteries press and hold the standby battery switch whilst operating the tilt motor via a handset.

b) Each battery within a pair should be at the same voltage (i.e. within 0.5V of each other).

c) If the voltage of one battery is significantly lower than the other (> 2V) change the Power supply assembly.

iii When changing batteries always change them as a pair (main or standby). Disconnect them at the inline connector on the top of each battery.

iv Replace covers, if required recondition the battery management system (see section 6.6.26) and check table functions.

6.3.3 Pedal dampers.

To replace a pedal damper if operation of the associated pedal shows sign of unit failure (pedal operation not damped), or oil is visible during inspection of the base during maintenance, refer to Fig. 6.2a or 6.2b as appropriate and proceed as follows.

i Ensure both pedals are in the raised position.

ii Remove the appropriate base cover as detailed in section 6.2.2.1.

iii To gain easier access for this procedure remove the damper angle bracket from the table base plate by removing its two retaining screws. This will enable the damper to be swung out and up clear of its low position making removal of the pivot pins easier.

iv Note the orientation of the spring clip on the piston pivot pins, this is critical and must be copied when replacing them (the limb of the clip should rest against the pedal anchor block to stop any lateral movement of the pedal assembly). Remove both the pivot pins and the faulty damper.

v Replace the damper with a new unit (piston end to the pedal anchor block end not the damper angle bracket end). When replacing pivot pins apply grease (part number 110477) and ensure the piston spring clip is in the correct orientation as noted in 'iv' above.

vi Compress or extend the damper length manually to enable the damper angle bracket to be secured back onto the base plate using threadlock (part number 670650) on the screw threads.

vii Reassemble table by reversing the above, replace covers as section 6.2.2.2 and check table base function.

6.3.4 Front wheels

To replace a front wheel in the event of wear or damage, refer to Fig. 6.2 and proceed as follows:

i Ensure both pedals are in the raised position.

ii Remove the appropriate base cover as detailed in section 6.2.2.1. Replace the castor pedal (see note in 6.2.2.2 iv) and raise the table onto its castors at the short trunk end.

iii Remove the screw from the wheel (its axle) and remove the wheel.

iv Replace the wheel with a new one and replace the screw using threadlock (part number 670650) on the screw thread. Tighten the screw until the wheel tread guards have been clamped reducing any lateral play to a minimum.

v Remove castor pedal, replace covers as 6.2.2.2, reattach castor pedal (see note in 6.2.2.2 iv) and check table base function.

6.3.5 Castors

6.3.5.1 Castor assembly

To replace a castor assembly in the event of wear or damage, refer to Fig. 6.2a or 6.2b as appropriate and proceed as follows noting that the procedure is similar for all castors. If replacing the wheels only refer to 6.3.5.2:

i Ensure both pedals are in the raised position.

ii Remove the appropriate base cover as detailed in section 6.2.2.1.

iii Remove the appropriate damper angle bracket and at the leg end remove the two fixing screws in each of the two outer pedal anchor blocks. In the case of the head end remove the two fixing screws in the outer pedal anchor block only.

iv If required remove the connection from the static discharge resistor assembly where it joins the table base and/or the earth lead connection.

v Slide the pedal spindle and lifting wheel assembly away from the remaining pedal anchor block and clear of the table base.

vi Lift the castor plate assembly up and off of the castor pillars. Remove the faulty castor from the castor plate (four screws). Note position of the isolating bushes, special washers and insulation pad.

vii Replace the new castor by reversing the above ensuring that the following points are observed:

a) Correct positioning of all components and refer to note on Fig. 6.2b.

b) Use threadlock (part number 670650) on all threads and tighten castor screws to 4Nm. Do not overtighten as this can compromise the insulation properties of the insulation pad.

c) Reapply grease (part number 110477) to castor pillars, bearings and pins.

d) Reconnect the static discharge assembly to the base plate and earth lead (if removed).

e) Check function of pedal latching mechanisms.

viii Check for a nominal resistance of 6.6MΩ between a table side rail and the surface of the castor wheel to which the resistor assembly (item 22 of Fig. 6.2) is connected, to ensure that the static path has not been compromised (or >100MΩ on other castors).

ix Reassemble table, replace covers as section 6.2.2.2 and check all base functions for correct operation.

6.3.5.2 Castor wheels

If replacing the castor wheels only proceed as follows:

i To replace the leg end wheels, raise both base pedals, remove the leg end base cover as detailed in section 6.2.2.1 and then change the leg end wheels as below in parts 'iii-v'.

ii If required (i.e. changing the head end wheels) refer to 6.3.5.1 follow parts 'ii-vi' and remove the head end castor plate assembly, then replace the head end wheels as below in parts 'iii-v'.

iii Remove the nut from the wheel spindle and replace the wheels as a pair (part number 110900, 2 per castor). If replacing the washers as well use 3 washers part number 710704 only. Use threadlock (part number 670650) on nut thread.

iv Reassemble the table by reversing the above ensuring that the following points are observed:

a) Correct positioning of all components.
b) Use threadlock (part number 670650) on all threads.
c) Reapply grease (part number 110477) to castor pillars, bearings and pins (if removed).

v Reassemble table, replace covers as section 6.2.2.2 and check all base functions for correct operation.

6.3.6 Brake pads

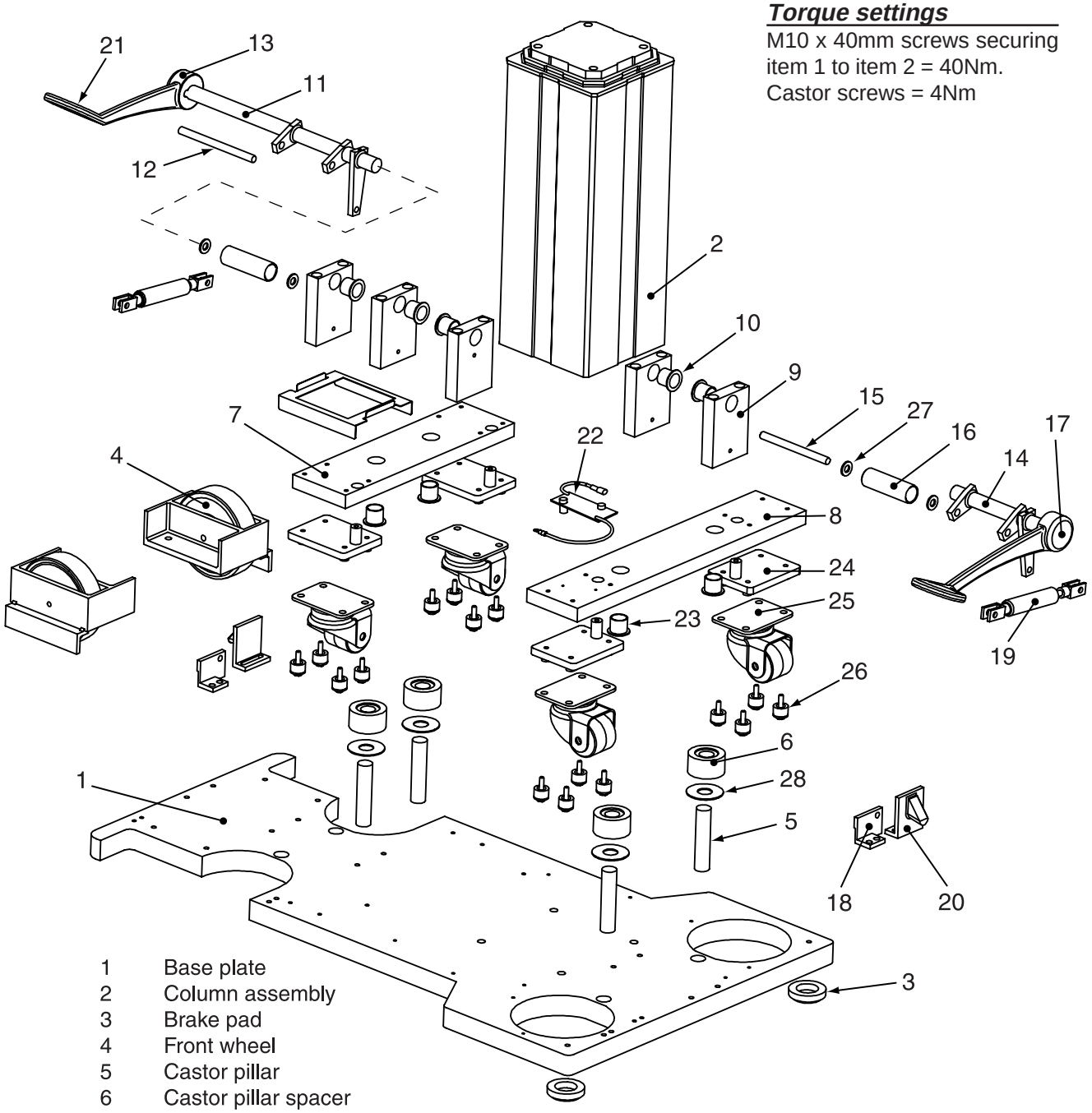
To change the brake pads when worn or hard and becoming brittle, refer to Fig. 6.2a or 6.2b as applicable and proceed as follows:

i Remove the head end base cover as detailed in section 6.2.2.2 and then replace the wheel foot pedal (see note in 6.2.2.2 iv).

ii Raise the table at the head end onto its castors (wheel orientation).

iii Always change both brake pads and use threadlock (part number 670650) on screw. If applicable ensure the spacer is replaced (SN T2AC or later only).

iv Remove wheel foot pedal, replace covers as 6.2.2.2 and check table base function.



1	Base plate
2	Column assembly
3	Brake pad
4	Front wheel
5	Castor pillar
6	Castor pillar spacer
7	Castor plate front
8	Castor plate rear
9	Pedal anchor block
10	Pedal spindle bush
11	Front pedal spindle assembly
12	Lifting wheel axle front
13	Brake pedal front (castor)
14	Rear pedal spindle assembly
15	Lifting wheel axle rear
16	Lifting roller assembly
17	Brake pedal rear (wheel)
18	Damper angle bracket
19	Pedal damper
20	Catch block
21	Pedal anti-skid pad
22	Resistor assy (static discharge)
23	Castor pillar bush
24	Castor insulation pad
25	Castor
26	Isolating bush and special washer
27	M10 Washer
28	Special neoprene washer

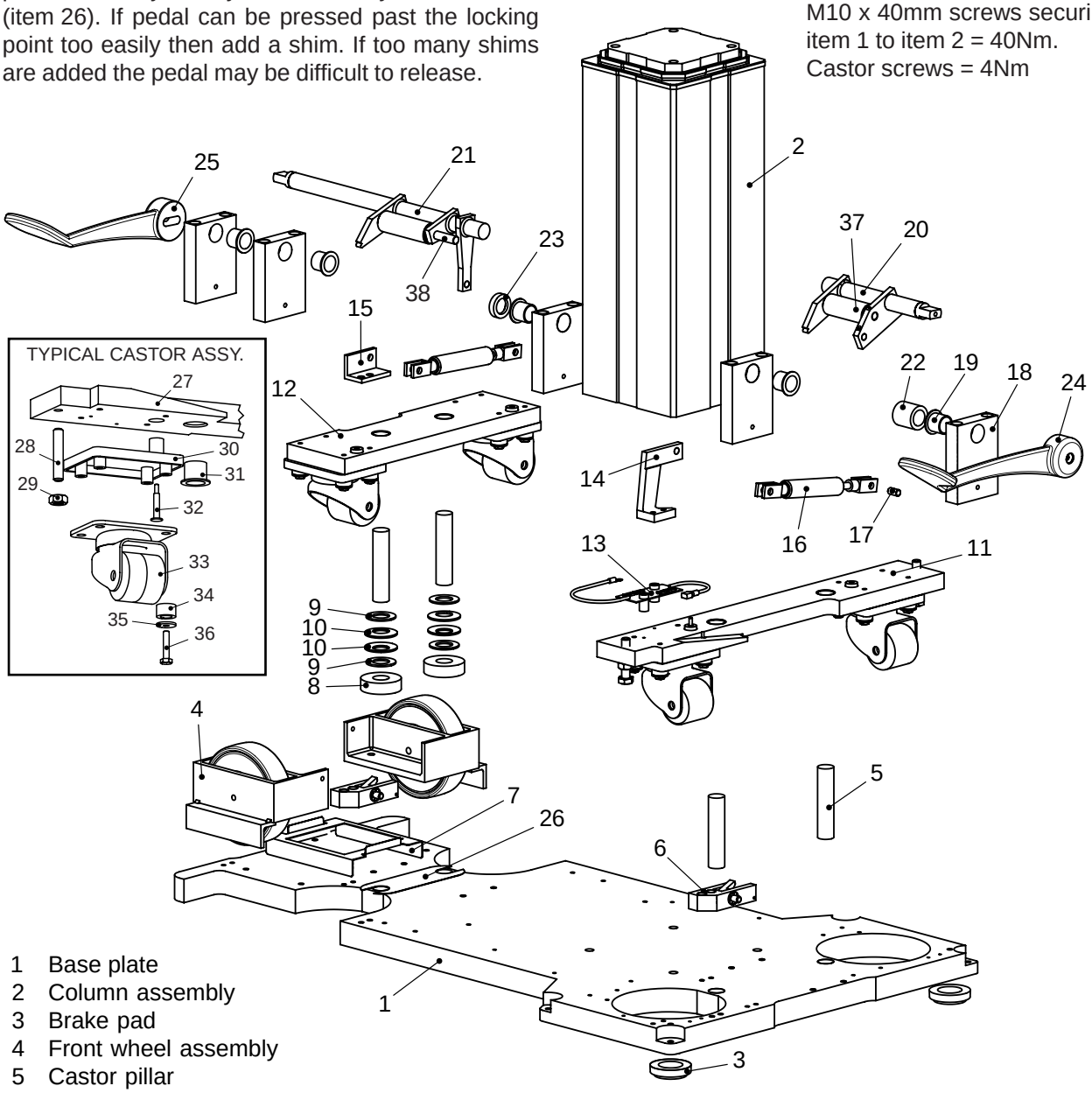
(Note: Item 28 no longer fitted)

Fig. 6.2a Table base general arrangement (external pedal catch)

Note: During maintenance of the front pedal or castor plate assembly it may be necessary to use shims (item 26). If pedal can be pressed past the locking point too easily then add a shim. If too many shims are added the pedal may be difficult to release.

Torque settings

M10 x 40mm screws securing item 1 to item 2 = 40Nm.
Castor screws = 4Nm



1 Base plate
2 Column assembly
3 Brake pad
4 Front wheel assembly
5 Castor pillar
6 Catch assembly
7 Standby battery tray
8 Front castor plate spacer
9 M20 Plain washer (form B)
10 Disc spring
11 Rear castor plate assembly
12 Front castor plate assembly
13 Static discharge resistor assy
14 Rear damper anchor bracket
15 Front damper bracket
16 Damper
17 Damper clevis pin*
18 Pedal anchor block
19 Headed bush
20 Rear pedal spindle assembly
21 Front pedal spindle assembly
22 Rear pedal shaft spacer
23 Front pedal shaft thrust ring
24 Rear pedal
25 Front pedal
26 Front castor plate shim
27 Castor plate
28 M10 x 50mm Screw
29 M10 nut
30 Castor insulation pad
31 Castor pillar bush
32 Static discharge connector
33 Castor
34 Isolating bush
35 Special washer
36 Hex. hd. set bolt
37 Lifting roller assembly
38 Lifting roller spindle

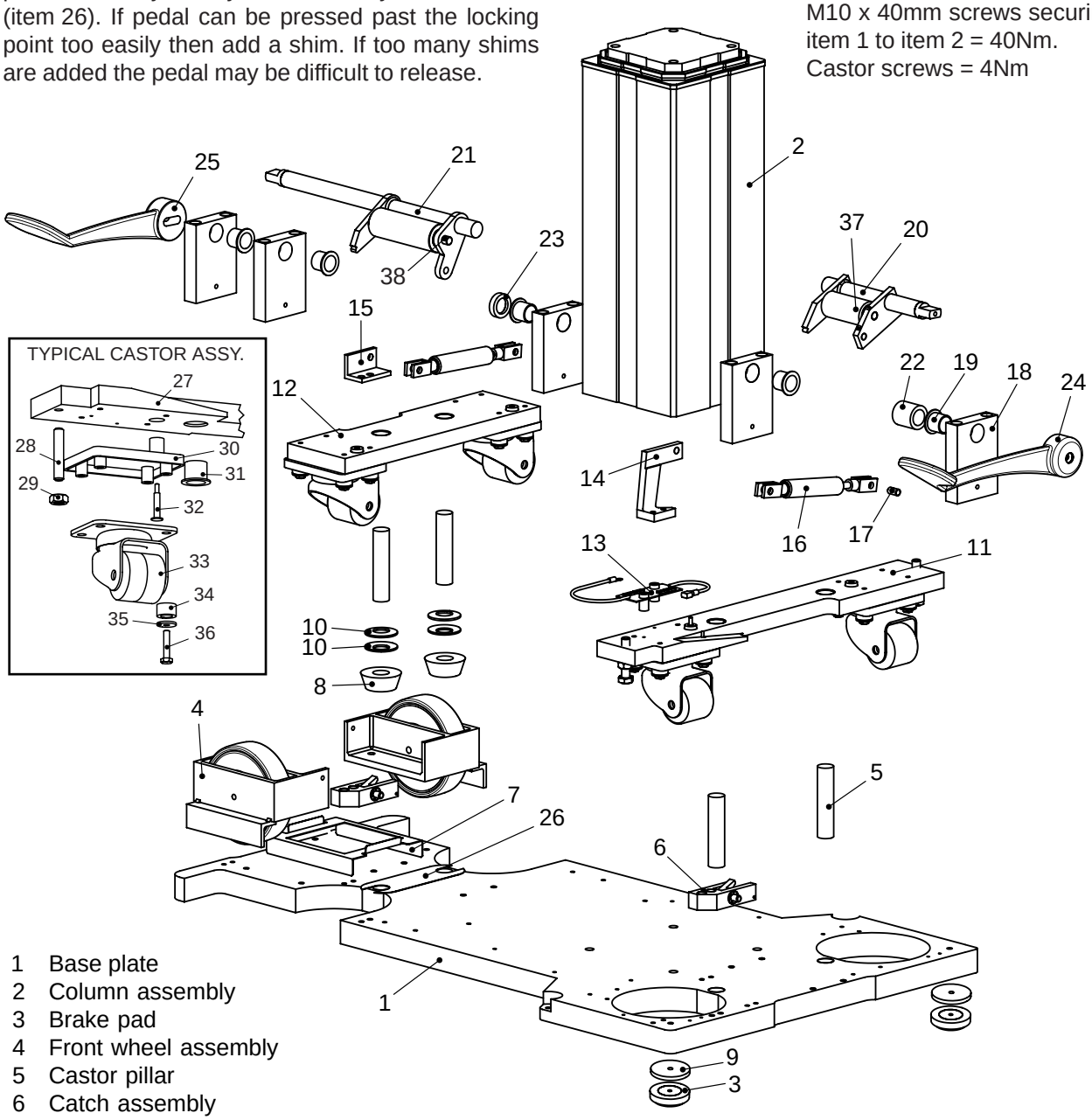
* or use clip supplied as part of Damper

Fig. 6.2b Table base general arrangement (internal pedal catch)

Note: During maintenance of the front pedal or castor plate assembly it may be necessary to use shims (item 26). If pedal can be pressed past the locking point too easily then add a shim. If too many shims are added the pedal may be difficult to release.

Torque settings

M10 x 40mm screws securing item 1 to item 2 = 40Nm.
Castor screws = 4Nm



1 Base plate
2 Column assembly
3 Brake pad
4 Front wheel assembly
5 Castor pillar
6 Catch assembly
7 Standby battery tray
8 Front castor plate spacer
9 Brake pad spacer
10 Disc spring
11 Rear castor plate assembly
12 Front castor plate assembly
13 Static discharge resistor assy
14 Rear damper anchor bracket
15 Front damper bracket
16 Damper
17 Damper clevis pin*
18 Pedal anchor block
19 Headed bush
20 Rear pedal spindle assembly
21 Front pedal spindle assembly
22 Rear pedal shaft spacer
23 Front pedal shaft thrust ring
24 Rear pedal
25 Front pedal
26 Front castor plate shim
27 Castor plate
28 M10 x 50mm Screw
29 M10 nut
30 Castor insulation pad
31 Castor pillar bush
32 Static discharge connector
33 Castor
34 Isolating bush
35 Special washer
36 Hex. hd. set bolt
37 Lifting roller assembly
38 Lifting roller spindle

* or use clip supplied as part of Damper

Fig. 6.2c Table base general arrangement (internal pedal catch and increased height, Serial Numbers prefixed T2AC or later)

6.3.7 Castor pillar bushes

To replace the castor pillar bushes if worn, refer to Fig. 6.2a or 6.2b as applicable and proceed as follows:

i Remove the applicable castor plate assembly as detailed in section 6.3.5.1 parts i-vi for castor replacement, noting part orientation.

ii Carefully tap out both headed bushes (always change as a pair) from the castor plate and replace with new bushes.

iii Reassemble as detailed in section 6.3.5.1 using the grease and threadlock as specified.

iv Replace covers as 6.2.2.2 and check table base function.

6.3.8 Pedal spindle bushes

To replace the pedal spindle bushes if worn, refer to Fig. 6.2a or 6.2b as applicable and proceed as follows:

i Before removing parts note the orientation of the bushes in the pedal anchor blocks.

ii Remove the applicable pedal spindle and lifting wheel assembly as detailed in section 6.3.5.1 parts i-vi for castor replacement and then remove the remaining anchor block as well.

iii Carefully tap out headed bushes from all applicable pedal anchor blocks and replace with new bushes (two anchor blocks head end, three anchor blocks leg end) always replace bushes as a spindle set.

iv Replace the rear pedal anchor block and then reassemble as detailed in section 6.3.5.1 using grease and threadlock as specified, taking care to replace pedal anchor blocks in the correct orientation.

v Replace covers as 6.2.2.2 and check table base function.

6.3.9 Lifting roller assembly

To replace the lifting wheel bearings if worn, refer to Fig. 6.2a or 6.2b as applicable and proceed as follows:

i Remove the applicable damper angle bracket from the table base plate as detailed in section 6.3.3 parts i-iii for pedal damper replacement.

ii Swing the lifting roller assembly and spindle clear of the pedal anchor blocks to enable removal of the lifting roller spindle.

iii Replace the complete lifting roller assembly (includes bearings) and reassemble, do not forget to refit the M10 washers at each end of the roller assembly.

iv Reassemble as detailed in section 6.3.3 using the grease and threadlock as specified.

v Replace covers as section 6.2.2.2 and check all base functions for correct operation.

6.3.10 Pedal catch block

To replace or adjust the pedal catch block (not fitted to tables with internal catch) if worn or damaged, place the table on a flat floor surface, refer to Fig. 6.2a and proceed as follows:

i Remove the applicable base cover as detailed in section 6.2.2.1.

ii If replacing the pedal catch block remove the two securing screws and replace with a new one using threadlock (part number 670650) on the screws and adjust as below.

iii To adjust the pedal catch block tighten (or loosen) the fixing screws so that the block just moves. Ensure the other pedal is in the raised position. Replace the pedal and push it down as far as it will go and move it towards the base. Slide the catch block towards the pedal until it just touches the top of the pedal arm. Tighten the catch block screws and check pedal operation.

iv Raise the pedal and remove it from the table.

v Replace covers as section 6.2.2.2 and check all base functions for correct operation.

6.3.11 Pedal anti-skid pads

To replace the pedal anti-skid pads when worn or contaminated with foreign matter, simply remove the old ones, clean the location recess thoroughly, remove the release paper from self-adhesive backing and adhere the new ones firmly in place. Note that the pads come as a pair and are left and right handed.

6.3.12 Pedal catch pawl and spring

To replace the pedal catch pawl or spring (only fitted to tables with internal pedal catch) if they are worn or damaged, refer to Fig. 6.2b and proceed as follows:

i Remove the applicable base cover as detailed in section 6.2.2.1.

ii Remove the two screws securing the pedal catch pawl assembly and remove the assembly from the table. To replace the spring simply remove the old one and replace with a new one. To replace the catch pawl remove one starlock washer and remove the pawl spindle. Assemble using a new catch pawl and new starlock washer.

iii Check catch pawl rotates freely and reassemble the pedal catch pawl assembly to the table and check pedal operation.

iv Replace covers as section 6.2.2.2 and check all base functions for correct operation.

6.4 TABLE COLUMN COMPONENTS

6.4.1 The following parts on the table column may need replacement in the event of wear, damage, or malfunction (see notes below in each section). The procedures for these are detailed in the sections that follow:

6.4.2 Trendelenburg actuator

6.4.3 Tilt actuator

6.4.4 Telescopic column assembly

6.4.5 Tilt and Trendelenburg actuator motor

6.4.6 Tilt bushes

6.4.7 Trendelenburg bushes

6.4.8 Bearing Pads

Fig. 6.2 and 6.3 show the general arrangement and identify the main parts of the table base assembly and column, refer to these as required.

6.4.2 Trendelenburg actuator

To replace the Trendelenburg actuator if damaged, worn or has failed (see section 6.6.8 to test motor and 6.4.5 for motor replacement) refer to Fig. 6.3 and proceed as follows:

i Gain access to the top of the column as detailed in section 6.2.3.

ii Remove motor cable spade connectors from where they connect onto the mid-column PCA (note two sizes to aid correct connection) and the earth lead.

iii See safety warnings in section 4.0 as the table top will not be stable during the following procedure. Remove the 'R' clips from the top and bottom pivot pins, remove the pins and remove the Trendelenburg actuator.

iv Before refitting a new Trendelenburg actuator check both pivot pins for wear and replace as required.

v Replace the Trendelenburg actuator by the reverse of the above and remake connections.

vi Reassemble table recalibrate Trendelenburg and carry out a function test.

6.4.3 Tilt actuator

Replacement of the Tilt actuator (see section 6.6.8 for motor test details and 6.4.5 for motor replacement) is similar to replacing the Trendelenburg actuator as detailed above in section 6.4.2, follow this to replace the tilt actuator (note no earth connection on tilt actuator). Recalibrate Tilt.

6.4.4 Telescopic column assembly

WARNING

Removal and replacement of the telescopic column assembly entails lifting the trunk sections, the complete wrapround assembly and blocking up the base assembly. These procedures require two people to perform safely, do not proceed unless two people are available.

To replace the telescopic column assembly (see section 6.6.9 for test details) place the table on a flat surface in the braked orientation and proceed as follows:

i Gain access to the top of the column as detailed in section 6.2.3.

ii Remove trunk sections as detailed in section 6.2.5 for bellows replacement (also see safety warnings section 4.0).

iii Remove the connector of the loom coming out the top of the cable guide chain, from the four actuator PCA, by pressing the release clips moulded into the plug.

iv Release the column energy chain (two screws top and bottom, may be hidden under cables) from the wrapround assembly removing cable ties as required (replace these on assembly).

v Release (see note below) the lower end of the height potentiometer cable from the base plate and allow it to slowly retract back. NOTE: DO NOT ALLOW CABLE TO SNAP BACK.

vi Loosen the wrapround/column slide bearings screws at the lower edge of the wrapround.

vii Remove the top of column cover to gain access to the four top of column cap head screws and remove them.

viii Lift the complete wrapround assembly up and off of the telescopic column assembly and carefully place to one side, leaving it in a stable position not resting on any fragile components.

ix Using suitable blocks jack up the table base (keep blocks clear of castors and wheels) to obtain access to the underside of the table base plate. Remove the four cap head screws that secure the telescopic column assembly to the table base plate.

x Note the orientation of the telescopic column assembly (by noting position of leads at the top of the assembly) and remove it from the base plate.

xi Replace the new telescopic column assembly, apply threadlock (part number 670650) to the screws and tighten to 40Nm.

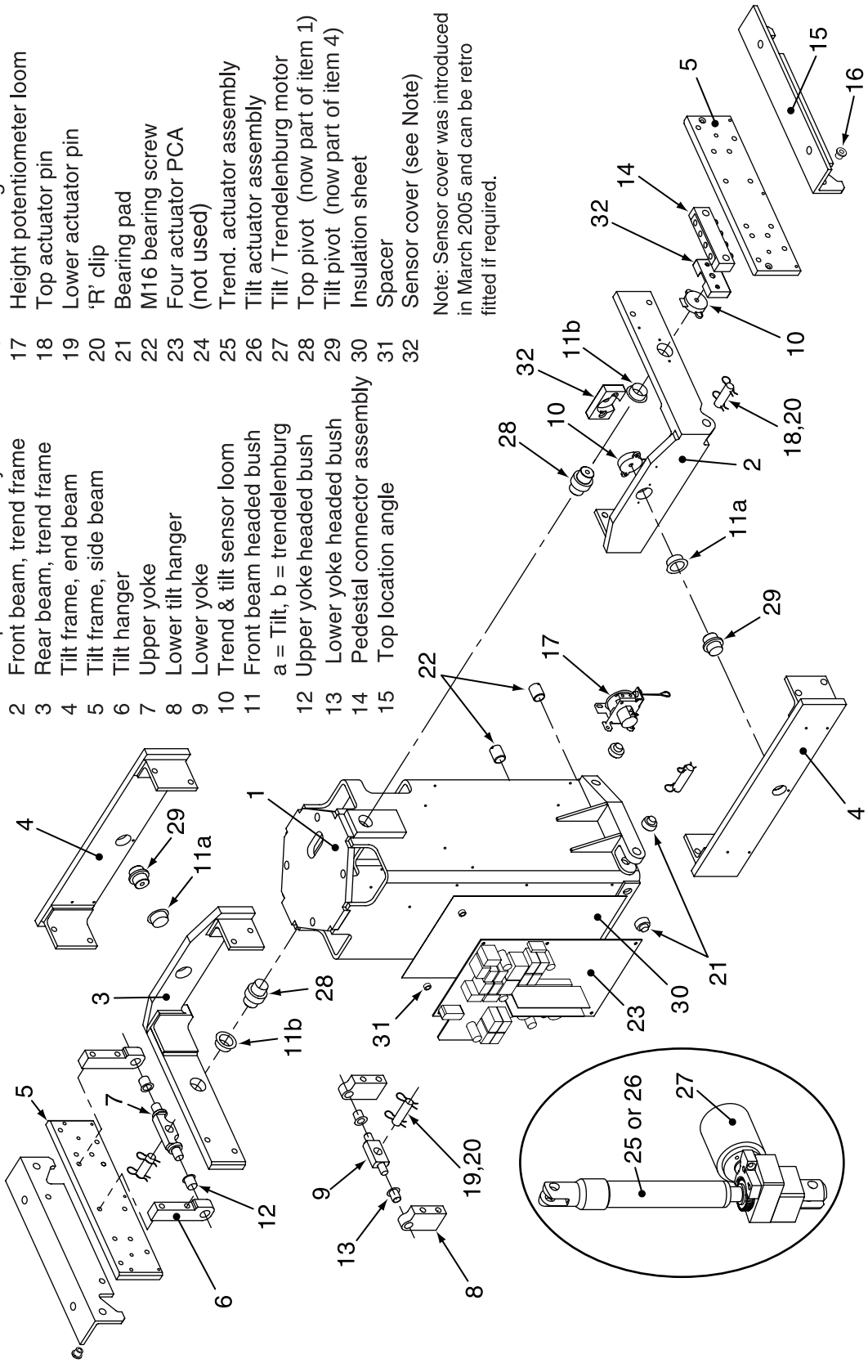


Fig. 6.3 Table column general arrangement

xii Reassemble table (see note below) by reversing the above noting use of grease and threadlock in the sections referred to and the warning at the top of this section. Check Appendix 2 and proceed as detailed in the 'Application software manual' before replacing covers. Finally test all table functions.
Note: When replacing the wrapround assembly tighten the four M10 screws (use of 4 x M10 spring washers now preferred to threadlock) but do not torque. Apply threadlock (part number 670650) to the four slide bearing screws (at the lower edge of the wrapround). Then whilst pushing the wrapround diagonally, so that it is firmly pressed against all four bearing pads, tighten the four slide bearings screws. Finally torque the four M10 screws to 40Nm.

6.4.5 Tilt and Trendelenburg actuator motor

To replace a Trendelenburg or tilt actuator motor (see section 6.6.8 for motor test details) refer to Fig. 6.3 and proceed as follows:

i Gain access to the top of the column as detailed in section 6.2.3.

ii Remove the motor cable spade connectors from where they connect onto the four actuator PCA (note two sizes to aid correct connection).

iii Remove the two motor fixing screws to release the motor assembly and then remove the motor mount from the motor (two screws).

iv Apply grease (part number 110477) to the worm. Fasten the motor mount onto the new motor, apply threadlock (part number 670650) to fixing screws.

v Check condition of wheel whilst disassembled and change actuator assembly if required. Apply grease (part number 110477) to the wheel.

vi Replace the new motor onto the location dowels apply threadlock (part number 670650) to the fixing screws.

vii Reassemble table by reversing the above and test all table functions.

6.4.6 Tilt bush

To replace a tilt bush (item 11a of Fig. 6.3) refer to Fig 6.3 and proceed as follows:

i Note the warning in section 6.2.5 before continuing. Remove the trunk sections and top location angles as detailed in section 6.2.5 for bellows replacement and the top of column cover (item 12 of Fig. 6.1).

ii It is recommended that both bushes (items 11a, Fig. 6.3) are replaced, one in the Trend frame front beam and one in the Trend frame rear beam (items 2 and 3 of Fig. 6.3). Remove the 'R' clip and pin from the top of the tilt actuator. Release the electrical connections as required and ensure the loom from the connector block is free from any fixing to the table.

iii Remove the connector assembly block (two screws) and release the tilt potentiometer.

iv Remove two screws at one junction of tilt frame end beam and a tilt frame side beam. Then remove the two screws diagonally opposite at the other junction of tilt frame end beam and tilt frame side beam.

v Slide off and remove the two pairs of tilt frame end and side beam assemblies.

vi Remove two screws at each junction of the Trendelenburg frame beams and slide off the two Trendelenburg frame assemblies.

vii Note orientation and carefully tap out both tilt frame headed bushes (always change as a pair) from the Trendelenburg frame, replace them with new bushes.

viii Reassemble by reversing the above using threadlock (part number 113042) on all tilt and trend gimbal frame screws and threadlock (part number 670650) on all other screws and grease (part number 110477) on the bearings and actuator pins. Ensure all loom cables are replaced as found, clear of all moving parts. Check Appendix 2 and proceed as detailed in the 'Application software manual' before replacing covers. Finally test all table functions.

6.4.7 Trendelenburg bush

Note the warning in section 6.2.5 before continuing. To replace a Trendelenburg bush (item 11b of Fig. 6.3) refer to section 6.4.6, proceed as detailed but replace the two Trendelenburg bushes (item 11b of Fig. 6.3) always replacing them as a pair.

Note: It will also be necessary to remove the 'R' clip and pin from the top of the Trendelenburg actuator and release the connection on the four actuator PCA (on the column) from the two potentiometers on the Trendelenburg frame and ensure the loom from the potentiometers is free from any fixing to the table. Replace and reconnect on assembly.

Check Appendix 2 and proceed as detailed in the 'Application software manual' before replacing covers. Finally test all table functions.

6.4.8 Bearing pads

To replace the bearing pads in the wrapround assembly proceed as follows:

i Remove the wrapround assembly as detailed in section 6.4.4 parts 'i-viii'.

ii Carefully tap out the four bearing pads and replace them with new ones (always replace as a set of four).

iii Reassemble the table by reversing the above noting the assembly notes in section 6.4.4 parts 'xi-xiii'.

iv Check Appendix 2 and proceed as detailed in the 'Application software manual' before replacing covers. Finally test all table functions.

6.5 TABLE SECTIONS

This section is split into two parts as follows:

6.5.1 Head and leg section (see Fig. 6.4).

6.5.2 Trunk sections, long and short (see Figs. 6.5 to 6.7).

6.5.1 Head and leg section

The following parts may need replacement in the event of wear or damage (see notes below in each section) and the procedures for these are detailed below:

6.5.1.1 Guide pins

6.5.1.2 Gas springs

6.5.1.3 Cover

6.5.1.4 Gas spring release head / pivot pin

6.5.1.5 Gas spring release handle

6.5.1.6 X-ray translucent top

See Fig. 6.4 for the general arrangement of the head and leg section assembly, the figure shows the leg section, but note that the head section is similar (no cross bar or middle side bar screws).

6.5.1.1 Guide pins

To replace a guide pin if worn or damaged remove the retaining screw and refit a new pin. Apply threadlock to the screw (part number 670650) and lubricate the pin sparingly with grease (part number 110477). Tighten securing screw to a torque setting of 8Nm. Check section fits table correctly.

6.5.1.2 Gas springs

WARNING
Gas springs are filled with high-pressure gas. DO NOT attempt to open them, see section 6.5.1.2 (vii) before disposal.

CAUTION
Gas springs do not require additional lubrication.

To replace a gas spring if it shows sign of oil leakage or has become spongy (pressure applied on one side of the section produces noticeably more movement than the other) proceed as follows:

i Remove section from table and rest it on a suitable work surface upside down.

ii Remove the shoulder screw in the mounting block at the cylinder end.

iii Release locking nut at the end of the piston and unscrew gas spring piston from release head casting.

iv Wind nut on the new gas spring well down thread, lubricate actuating nipple with grease (part number 110477). Screw gas spring into the release head casting until play has been removed between the release handle actuator and the gas spring release button, then back off approximately half a turn. Apply threadlock (part number 670650) and tighten the piston-locking nut onto the release head casting.

v Apply grease (part number 110477) to the shank and threadlock (part number 670650) to the thread of the shoulder screw and replace it into the mounting block, tighten to a torque setting of 10Nm.

vi Actuate the release lever to align the guide pins and replace section into a table trunk section. Check that the section works correctly and that both gas springs are working together, adjust if required as 'iv' above and remove any excess threadlock.

vii. Before disposing of the gas spring it is suggested that the high pressure gas is released from within the cylinder to avoid the possibility of injury (or return it to Eschmann Equipment). To release the gas (nitrogen and a small amount of hydraulic oil) locate the gas spring positively onto the bed of a drilling machine taking care not to puncture the cylinder. Do not centre punch to provide a drill guide as this may rupture the cylinder and wear suitable eye and hand protection. Use a 2-3mm diameter drill at slow speed and drill a hole 25-30mm from the mounting end of the cylinder to a depth of half the cylinder diameter to vent the gas. Clean up any oil spillage.

6.5.1.3 Top cover

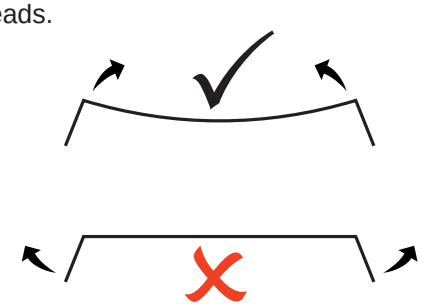
To replace a top cover if damaged proceed as follows:

i Remove section from table and rest it on a suitable work surface upside down.

ii Remove the four M8 screws (six on the leg section) that secure the sidebars.

iii Turn section over and remove the mattress retainers.

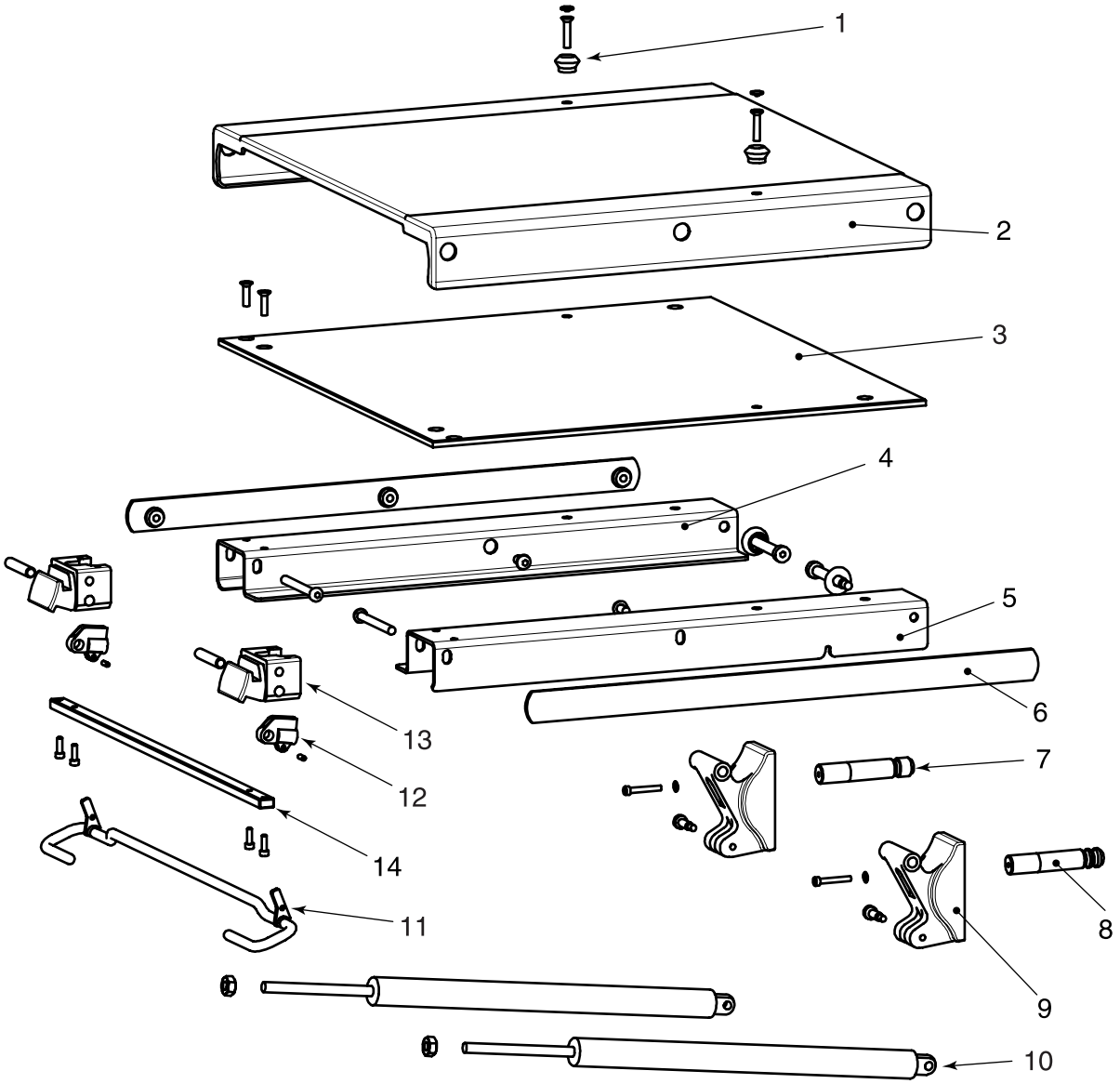
iv Carefully release the lower edge of the cover on each side and flex the cover from the middle, do not bend out the sides, see diagram. Replace cover with the new one and replace the mattress retainers using threadlock (part number 670650) on the screw threads.



v Replace the sidebars and secure using threadlock (part number 670650) on the screw threads and tighten to a torque setting of 15Nm. Finally check section function.

Torque settings

Guide pin screw = 8Nm
Gas spring shoulder screw = 10 Nm
Sidebar screw = 15Nm



1	Mattress retainer (2)	8	Guide pin locking
2	Cover	9	Mounting block (2)
3	X-ray translucent top	10	Gas spring (2)
4	Side arm	11	Gas spring release handle
5	Side arm	12	Release head, gas spring (2)
6	Side bar (2)	13	End cap (2)
7	Guide pin	14	Cross bar (leg section only)

Fig. 6.4 General arrangement of head and leg section.
(Note: Leg section illustrated)

6.5.1.4 Gas spring release head / pivot pin

If the piston end of a gas spring shows sign of excess wear or play at its pivot, remove the pivot pin and release head, check for wear and replace parts as required following the procedure below:

i Remove the cover as detailed in section 6.5.1.3.

ii Remove the gas spring as detailed in section 6.5.1.2.

iii On a leg section remove the cross bar by removing the four retaining screws.

iv Remove the end cap by removing its fixing screws and slide it out of the side arm.

v Remove the pivot pin from the end cap and check it and the release head for wear or damage, replace parts as required.

vi Reassemble using the reverse of sections 'i-v' above lubricating the pivot pin with grease (part number 110477) and noting the use of grease, threadlock and torque values (Fig 6.4) when replacing the gas spring and sidebar screws (see sections 6.5.1.2 and 6.5.1.3). On the leg section the cross bar screws also require threadlock (part number 670650). Finally check section function.

6.5.1.5 Gas spring release handle

If the gas spring release handle is damaged remove and replace it as below:

i Remove section from table and rest on a suitable work surface upside down.

ii Using a suitable punch knock out the roll pins that hold the handle in the release heads.

iii Reassemble by reversing the above lubricating with grease (part number 110477) and finally check section function.

6.5.1.6 X-ray translucent top

To replace an X-ray translucent top proceed as follows:

i Remove cover from section as 6.5.1.3.

ii Remove old, and replace new, X-ray translucent top.

iii Reassemble section as 6.5.1.3 and finally check section function.

6.5.2 Trunk sections

The following parts may need replacement in the event of wear or damage (see notes below in each section and test details in the relevant part of section 6.6 before replacement). The procedures for these part replacements are detailed in the sections shown below:

6.5.2.1 Traverse motor

6.5.2.2 Traverse drive belt

6.5.2.3 Break motor

6.5.2.4 Break gearbox

6.5.2.5 Side rails

6.5.2.6 Top covers

6.5.2.7 Push button components

6.5.2.8 Traverse rod bearing

6.5.2.9 Drive belt guide needle bearing

6.5.2.10 Attachment blocks

6.5.2.11 Black tops

To gain access for some of these procedures it is not necessary to remove the trunk sections but to simply tip the table into the 'Service Position' see section 1.9. Note safety warning in section 4.0.

6.5.2.1 Traverse motor

To replace a traverse motor first check that the motor has failed (and not the control circuit) as detailed in section 6.6.6. If the motor has failed replace it as follows, noting comments for later tables:

i Place the table into the 'Service position' as detailed in section 1.9 (noting safety warnings in Section 4.0) to gain access to the bottom cross beam cover (item 17 of Fig. 6.7) which can now be removed.

ii Slacken two M8 locking nuts releasing belt tension as much as possible (not necessary on later tables). Note the path of the drive belt before removing the motor assembly. Remove the two M6 socket head screws securing the motor support posts to the traverse crossbeam assembly (item 1 of Fig. 6.7). Remove the motor assembly and then remove the two spade connections (noting orientation) from the motor terminals.

iii Release the screw securing the pulley to the motor spindle and remove the three screws holding the motor to the motor support plate.

iv Secure the new motor to the motor support plate (use threadlock part number 670650 on all these and all other screw threads), replace the pulley but do not tighten the securing screw at this stage.

v Connect the motor to the original spade connectors ensuring correct orientation and reassemble the motor assembly to the traverse cross beam ensuring the belt is correctly routed by referring to Fig. 6.7. Align the pulley and tighten the location screw, note torque setting of 9Nm.

vi Adjust the belt tensioners* and tighten them when adequate tension is achieved, do not over tighten to the extent that the inner faces of the belt touch. Run the traverse motor from a 24V (d.c.) supply and check for correct belt alignment, repeat in the opposite direction.
* Adjust tension on later tables by rotating motor plate about support 'A', tighten support 'B' then 'A' when tension correct (see Fig. 6.7).

vii Continue to reassemble the table by reversing section 'i' above.

viii Test all table functions.

6.5.2.2 Traverse drive belt

To replace a traverse drive belt proceed as follows, noting comments for later tables:

i Place the table into the 'Service position' as detailed in section 1.9 (noting safety warnings) to gain access and remove the bottom cross beam cover (item 17 of Fig. 6.7).

ii Remove the two M10 set screws in the break attachment blocks (items 11 and 14 of Fig. 6.5) clamping the ends of the lead screws. By turning each lead screw or by moving the drive belt, wind lead screws out of the traverse nuts (item 8, Fig. 6.7) towards the head end (long trunk). Note that dome plugs will be ejected from the attachment blocks.

iii Slacken the two M8 locking nuts to release the belt tension as much as possible (not necessary on later tables). Note the path of the drive belt (shown in Fig. 6.7).

iv Remove two M6 socket head screws securing the motor support posts to the traverse crossbeam assembly (item 1 of Fig. 6.7). Slide motor assembly away from the cross beam to free the drive belt.

v Remove the head end (long trunk end) limit switch pins (item 11 of Fig. 6.7).

vi Remove the traverse nut housings (item 9 of Fig. 6.7) one at a time. Release the old drive belt and reassemble each traverse nut housing with the new drive belt ensuring correct orientation of parts (bearings should have the text facing out).

vii Loosen the traverse motor assembly belt tensioners (not necessary on later tables) and replace the motor assembly onto the crossbeam frame note torque value of 9Nm. Ensure the correct routing of the drive belt (see Fig. 6.7) and adjust the belt tensioners*, tighten them when adequate tension is achieved, do not over tighten to the extent that the inner faces of the belt touch.
* Adjust tension on later tables by rotating motor plate about support 'A', tighten support 'B' then 'A' when tension correct (see Fig. 6.7).

viii Run the traverse motor with a 24V d.c. supply and check for correct belt alignment. Repeat in opposite direction. Reposition motor drive pulley if required.

ix Power or turn lead screws back into break attachment blocks and when both are correctly aligned (the flats on the lead screws are vertical and facing their M10 set screws, see note below) tighten the two M10 set screws in the break attachment blocks to clamp the lead screw, note torque setting of 20Nm. Replace the dome plugs in attachment blocks.
Note: When tightening the M10 set screws ensure that they only engage onto the flat of the lead screw and do not engage onto the thread of the lead screw.

x Reassemble the table by reversing the above and test all table functions.

6.5.2.3 Break motor

To replace a break motor proceed as follows noting that either of the two motors could have failed and both need to be checked:

i Traverse the table top to a suitable position and remove the short trunk bottom covers (items 3 and 11 of Fig. 6.6) from the short trunk.

ii Remove the motor connector from the loom junction and remove the two motor fixing screws to release the motor. Then check that the motor has failed (and not the control circuit) as detailed in section 6.6.7. If the motor has failed replace it as below, or replace the original and then check the other break motor.

iii Remove the drive connector from the old motor before discarding.

iv Replace the drive connector onto the new motor and reassemble the table by reversing the above (use threadlock part number 670650 on screw threads and see note on Fig.6.6).

v Test all table functions.

6.5.2.4 Break gearbox

To replace a break gearbox (which includes the motor) proceed as follows:

i Traverse the table top to a suitable position and remove the short trunk bottom covers (items 3 and 11 of Fig. 6.6) from the short trunk.

ii Remove the short trunk top cover as detailed in section 6.5.2.6.

iii Remove connections from the break potentiometer loom and from the break motor where they join the break motor loom. Remove the break potentiometer cover and then the break potentiometer loom from the break gearbox and retain the break potentiometer loom to fit to the new gearbox.

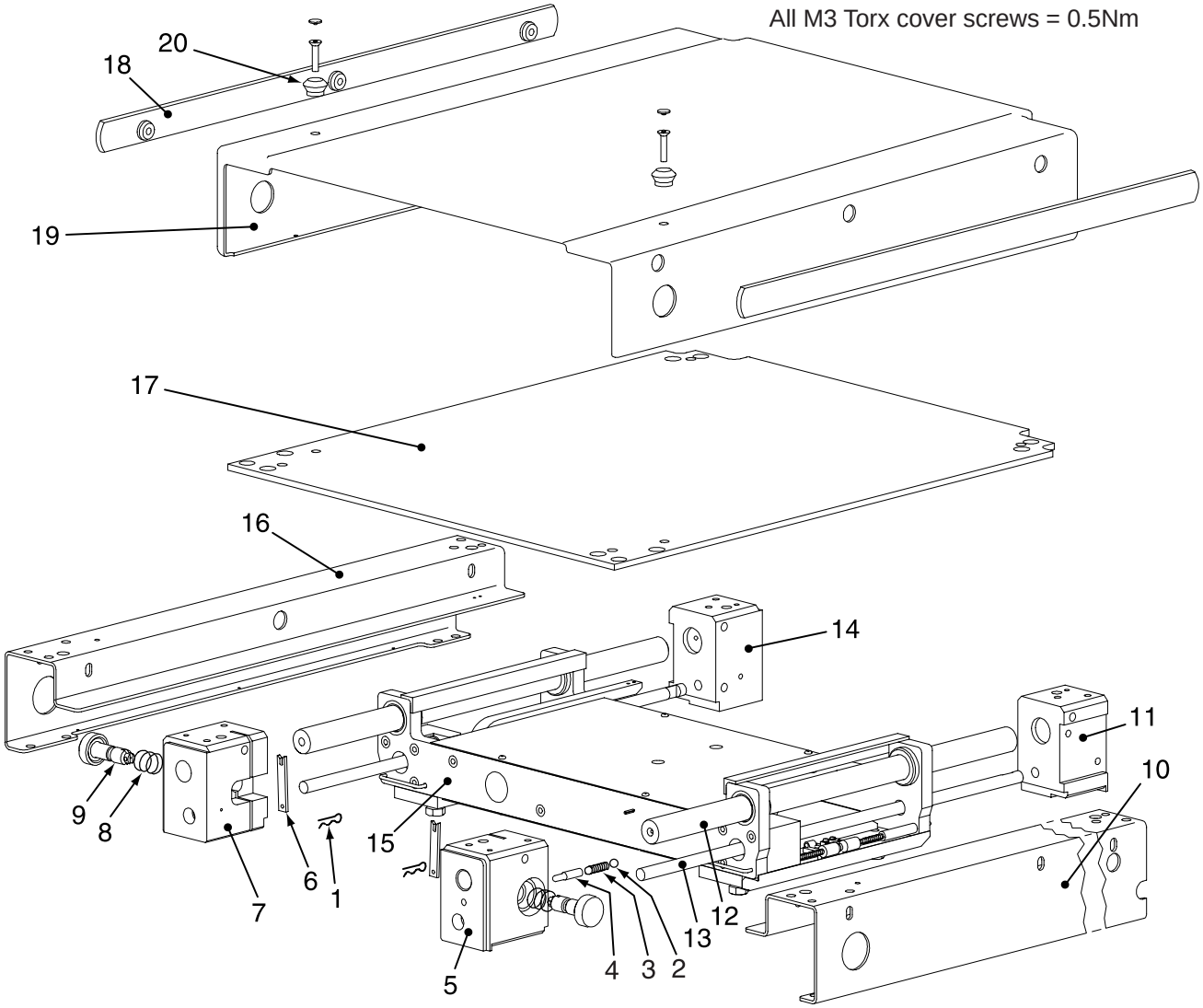
iv Remove the long trunk cover (see 6.5.2.6) and the short trunk black top (see 6.5.2.12) and do not replace black top until after recalibration. Remove the two countersunk M8 screws that secure the arm of the break gearbox assembly to the long trunk and remove the short trunk side arm with the gearbox attached.

v Remove the gearbox from the short trunk side arm by removing the three M8 button head screws (two at the top one underneath) and the black top location dowel (retain for replacing into the new gearbox).

vi Reassemble the table (use threadlock part number 670650 on screw threads, see note on Fig.6.6 and note any applicable torque values shown on Fig. 6.5 and 6.6) but note that the break potentiometers will need to be recalibrated before refitting the black top to the short trunk. Check Appendix 2 and proceed as detailed in the 'Application software manual'.

Torque settings

Lead screws M10 set screw = 20Nm
Actuator arms M8 csk. screw = 14 Nm
Sidebar screw = 21Nm
Black top M6 csk. screw = 6 Nm
All M8 button head screws = 10Nm
All M3 Torx cover screws = 0.5Nm



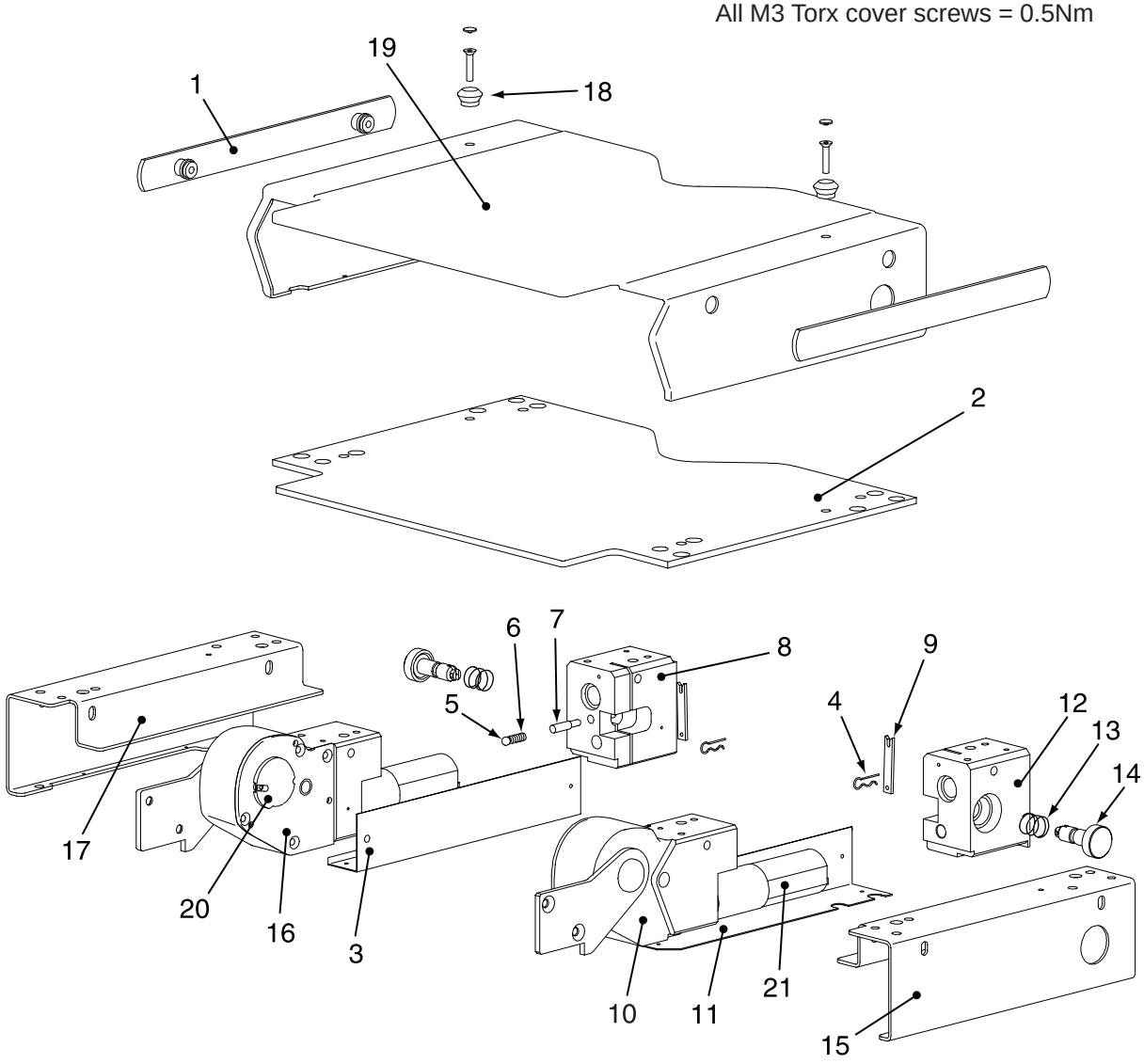
1 'R'-clip
2 Ball bearing
3 Spring compression
4 Plunger for push button
5 Attachment block right hand
6 Push button blade
7 Attachment block left hand
8 Spring compression
9 Push button
10 Side arm long trunk right hand
11 Break attachment block right hand
12 Traverse rod
13 Leadscrew traverse
14 Break attachment block left hand
15 Traverse powered assembly (see Fig. 6.4)
16 Side arm long trunk left hand
17 Black top long trunk
18 Side rail long trunk UK
19 Cover long trunk
20 Mattress retainer

Fig. 6.5 Table long trunk general arrangement

Note: On later tables ensure that the grommet strip is in place in the cable and conduit slot of items 3 and 11.

Torque settings

Lead screws M10 set screw = 20Nm
Actuator arms M8 csk. screw = 14 Nm
Sidebar screw = 21Nm
Black top M6 csk. screw = 6 Nm
All M8 button head screws = 10Nm
All M3 Torx cover screws = 0.5Nm



1	Side rail short trunk UK	12	Attachment block left hand
2	Black top short trunk	13	Spring compression
3	Cover bottom short trunk left hand	14	Push button
4	'R'-clip	15	Side arm short trunk right hand
5	Bearing	16	Break gearbox assembly left hand
6	Spring compression	17	Side arm short trunk left hand
7	Plunger for push button	18	Mattress retainer
8	Attachment block right hand	19	Cover short trunk
9	Push button blade	20	Break potentiometer loom
10	Break gearbox assy right hand	21	Motor
11	Cover bottom short trunk right hand		

Fig. 6.6 Table short trunk general arrangement

vii Continue to reassemble the table by reversing the above (use threadlock part number 670650 on screw threads and note any applicable torque values shown on Fig. 6.5 and 6.6). Ensure all electrical connections are remade and all looms are secured as found and carry out a full function test.

6.5.2.5 Side rails

To replace a long or short trunk side rail proceed as follows, traversing the table (fully cranially) as required to gain access to the fixing screws:

i Remove the screws securing the side rail from beneath the table top on the inside edge of the side arms (items 15 and 17 of Fig. 6.6 and items 10 and 16 of Fig. 6.5). Note that on the long trunk section there is a central short screw that can be released through the hole on the inside of the side arm.

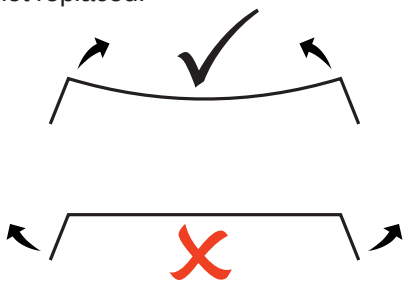
ii Secure the new side rail to the section (use threadlock part number 670650 on screw threads and note torque value of 21Nm).

6.5.2.6 Top covers

To remove or replace a long or short trunk top cover proceed as follows, traversing the table as required to gain access to the fixing screws:

i Remove the side rails as detailed in section 6.5.2.5 and then the small screws securing the lower edge of the cover to the side arms.

ii Remove the screw cover on the mattress retaining screws and then remove the mattress retainers. Carefully release the lower edge of the cover on each side and flex the cover from the middle to release it, not by bending out the sides, see diagram below. Take care not to damage it if it is to be reused and not replaced.



iii To replace the cover reverse the above using threadlock part number 670650 on all screw threads (except the small M3 Torx screws retaining the lower edge of the cover, note torque setting of 0.5Nm for these) and note any other applicable torque values shown in Fig. 6.5 and 6.6.

6.5.2.7 Push button components

The push button assembly (locking or non-locking) does not require any special adjustment after assembly. Should any part require replacement or cleaning follow the method below to take the assembly apart and reassemble it, replacing parts as required during the procedure. On the short trunk it will be necessary to remove the 'P' clip on the break gearbox loom and the bottom cover (item 3 and 11 of Fig. 6.6).

i Remove the 'R' clip in the end of the push button from below the table top. This will release all the push button components (locking or non-locking).

ii Slide out the push button with its return spring and for the locking push button push the plunger (i.e. item 4 of Fig. 6.5) out the back of the attachment block which will eject the ball bearing and compression spring.

iii Clean or replace components as required, clean out any debris from recess and reassemble without lubrication. Ensure that on assembly the slot in the top of the push button blade is correctly positioned over the roll pin in the attachment block.

iv Reassemble the table (use threadlock part number 670650 on screw threads and note any applicable torque values shown in Fig. 6.5 and 6.6) replacing the 'P' clip and the bottom cover if removed and check button function by attaching and removing a suitable table section several times.

6.5.2.8 Traverse rod bearing

To replace the traverse rod bearings item 3 of Fig. 6.7 (always replace as a set of four) proceed as follows:

i Remove the long trunk section cover as 6.5.2.6.

ii Remove the short trunk bottom covers (items 3 and 11 of Fig. 6.6) and release connections from the break potentiometer loom and connections from the break motor where they join the break motor loom .

iii Remove the four M8 countersunk screws securing the short trunk in place (two either side) and remove the short trunk by sliding the gearbox arms out of the long trunk.

iv Remove the set screws securing the end of the lead screws (items 13 of Fig. 6.5) and remove the black top (items 17 of Fig. 6.5) from the long trunk section.

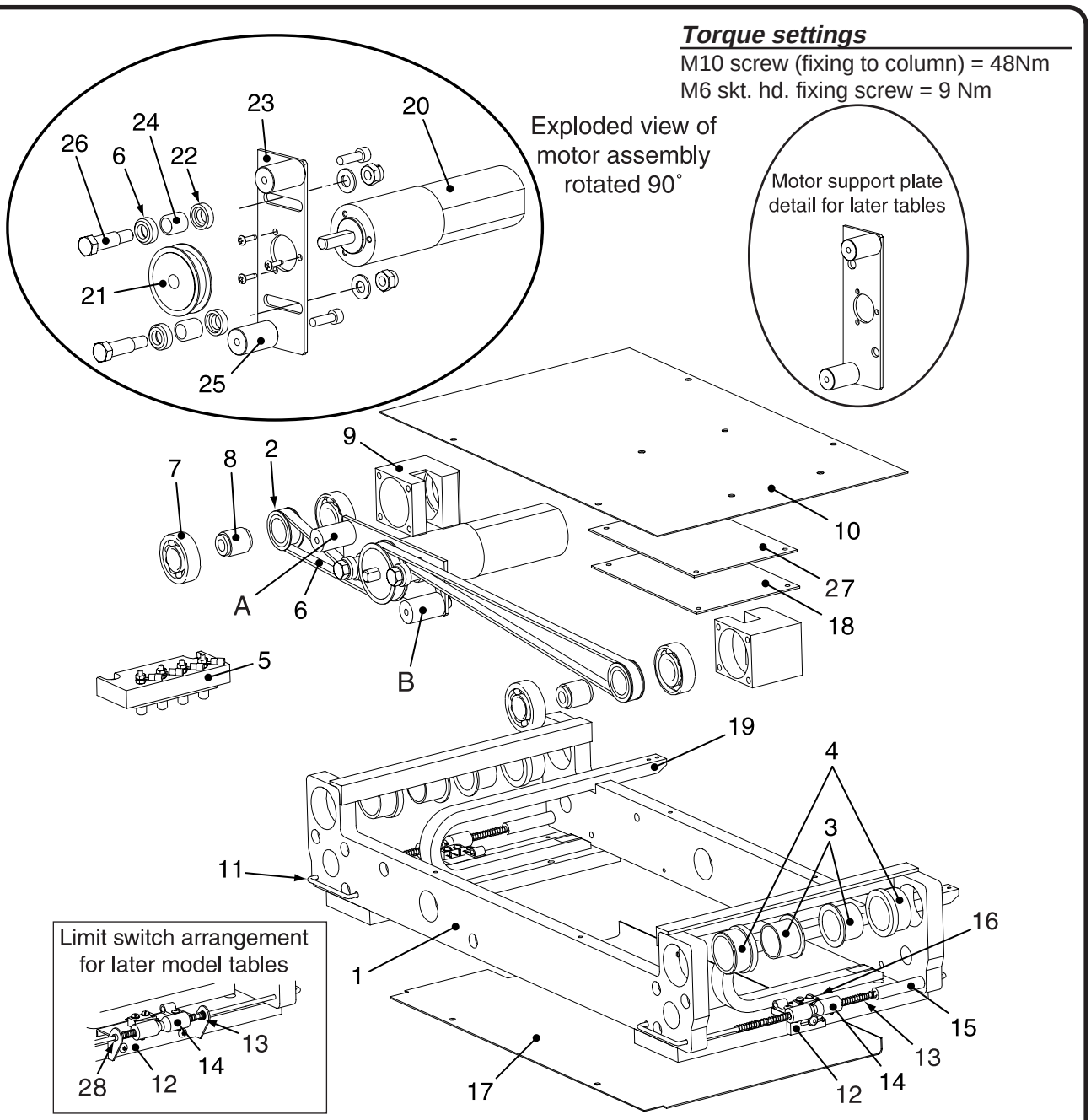
v Remove the black top location dowels from the break attachment blocks (items 11 and 14 of Fig. 6.5) and all the button head screws.

vi Whilst supporting each side arm in turn withdraw the break attachment blocks.

vii Slide out the traverse rods and knock out the traverse rod bearings.

viii Carefully replace the new set of bearings and reassemble the table by reversing the above (use threadlock part number 670650 on screw threads, see note on Fig.6.6 and note any applicable torque values shown in Fig. 6.5, 6.6 and 6.7 (e.g. lead screw set screw 20Nm black top screws 6Nm). Ensure all electrical connections have been made.

ix Test all table functions.



1	Traverse crossbeam assy. fixed top	15	Spacer
2	Pulley	16	Traverse motor loom & m'switches
3	Igus bearing	17	Cover crossbeam bottom (early version drawn)
4	Traverse bearing housing	18	Three actuator PCA
5	Top connector assy.	19	Break gearbox loom
6	Belt	20	Valeo motor
7	Bearing	21	Pulley
8	Traverse nut	22	Flange
9	Traverse nut housing	23	Traverse motor plate
10	Cover crossbeam top	24	Needle bearing
11	Traverse limit switch pin	25	Traverse motor plate support
12	Traverse limit switch bracket	26	Shoulder screw M8 nonstandard
13	Spring compression	27	Insulation sheet
14	Traverse limit switch cam	28	Headed bush

Fig. 6.7 Table traverse general arrangement

6.5.2.9 Drive belt guide needle bearing

To replace a traverse drive belt guide needle bearing (item 24 of Fig. 6.7) proceed as follows:

i. Remove the motor assembly as detailed in section 6.5.2.1 parts 'i-ii'.

ii Remove the two nuts on the shoulder screws (item 26 of Fig. 6.7) and release the two needle bearings.

iii Replace the new bearings, pack with grease (part number 110477) and reassemble the motor assembly (use threadlock part number 670650 on screw threads and note any applicable torque values) noting part orientation as shown in Fig. 6.7.

iv Reassemble as section 6.5.2.1 parts 'v-viii'.

v Test all table functions.

6.5.2.10 Attachment blocks

To replace an attachment block if the guide pin location hole is worn or if the block is damaged, proceed as follows:

i Remove the appropriate sections top cover as 6.5.2.6 parts 'i-ii'.

ii Remove the sections black top.

iii Remove the black tops location dowel using a jacking screw if required and then all the button head screws securing the attachment block.

iv Remove the 'R' clip and dismantle and remove all the push button components as 6.5.2.7.

v Slide out the attachment block and replace it with the new one. Reassemble the push button components as 6.5.2.7.

vi Reassemble the table by reversing the above (use threadlock part number 670650 on screw threads and note any applicable torque values shown in Fig. 6.5 and 6.6).

vii Test all table functions.

6.5.2.11 Black tops

To replace a black top if damaged, proceed as follows:

i Remove the appropriate sections top cover as 6.5.2.6 parts 'i-ii'.

ii Remove the sections black top and replace it with the new one.

iii Reassemble the table by reversing the above (use threadlock part number 670650 on screw threads and note any applicable torque values shown in Fig. 6.5 and 6.6).

iv Test all table functions.

6.6 ELECTRICAL COMPONENTS

WARNING

Ensure correct procedures are used if mains voltages are exposed. Take care when handling or getting close to PCAs as some components can become hot enough to cause burns. When testing the table take care that any attached leads or cables do not constitute a tripping hazard. Also see safety warnings section 4.0.

CAUTION

Do not power any motor directly from the batteries if movement is near to either end of its limit without ensuring that the direction of movement is away from that limit.

6.6.1 The following parts may need replacement in the event of failure (see notes below in each section for test details prior to removal). The procedures for replacement are detailed in the following sections:

6.6.2 Three actuator PCA
6.6.3 Four actuator PCA
6.6.4 Infrared receiver PCA
6.6.5 Power supply assembly
6.6.6 Traverse motor
6.6.7 Break motor
6.6.8 Tilt and Trendelenburg motors
6.6.9 Telescopic column assembly
6.6.10 Break potentiometer loom
6.6.11 Tilt potentiometer loom
6.6.12 Trendelenburg potentiometer loom
6.6.13 Height potentiometer loom
6.6.14 Traverse motor loom & m'switches
6.6.15 Connector block assemblies & looms
6.6.16 Switch and accessory panel looms
6.6.17 Column energy chain and loom
6.6.18 Break gearbox loom
6.6.19 Batteries
6.6.20 Fuses
6.6.21 Table infrared, code change
6.6.22 Infrared handset, code change
6.6.23 Handset service
6.6.24 Processor PCA
6.6.25 Standby panel and loom

During part replacement ensure that all assembly notes are followed with respect to lubrication and torque values. The chart in Appendix 2 gives a guide on what aspects need to be considered in terms of programming, configuring and calibration for most items that may need to be replaced. Also note Appendix 3 (the schematic diagrams) and Appendix 4 (Electrical safety checks).

Note: Potentiometers can be tested before replacement as detailed in the 'Application software manual'.

6.6.2 Three actuator PCA

To replace a three actuator PCA (item 18 of Fig. 6.7) proceed as follows:

i Place table into the 'Service position' as detailed in section 1.9 (noting safety warnings) and then remove the bottom crossbeam cover (item 17 of Fig. 6.7).

ii Remove all connections to the three actuator PCA and remove it from within the crossbeam.

iii Replace the new three actuator PCA with the old insulation sheet, reconnect all the connections and then check Appendix 2 and proceed as detailed in the 'Application software manual'.

iv Reassemble the table and carry out a full table function test.

6.6.3 Four actuator PCA

To replace a four actuator PCA (item 23 of Fig. 6.3) proceed as follows:

i Gain access to the upper column as detailed in section 6.2.3.

ii Remove all connections to the four actuator PCA and remove it from the column (remove the four M4 screws and take care not to loose the four small spacers).

iii Replace the new four actuator PCA with the insulation sheet and spacers as found, reconnect all the loom connections and then check Appendix 2 and proceed as detailed in the 'Application software manual'.

iv Reassemble the table and carry out a full table function test.

6.6.4 Infrared receiver PCA

To replace an infrared receiver PCA proceed as follows:

i Remove the appropriate base cover as detailed in section 6.2.2 (take care of loom to PCA).

ii Remove the infrared receiver PCA from inside the cover. These are held in place with two plastic rivets, simply pull out the rivet to release the PCA, the mount will remain on the cover.

iii Replace the new PCA and secure in place with the two rivets, reassemble and carry out a full table function test.

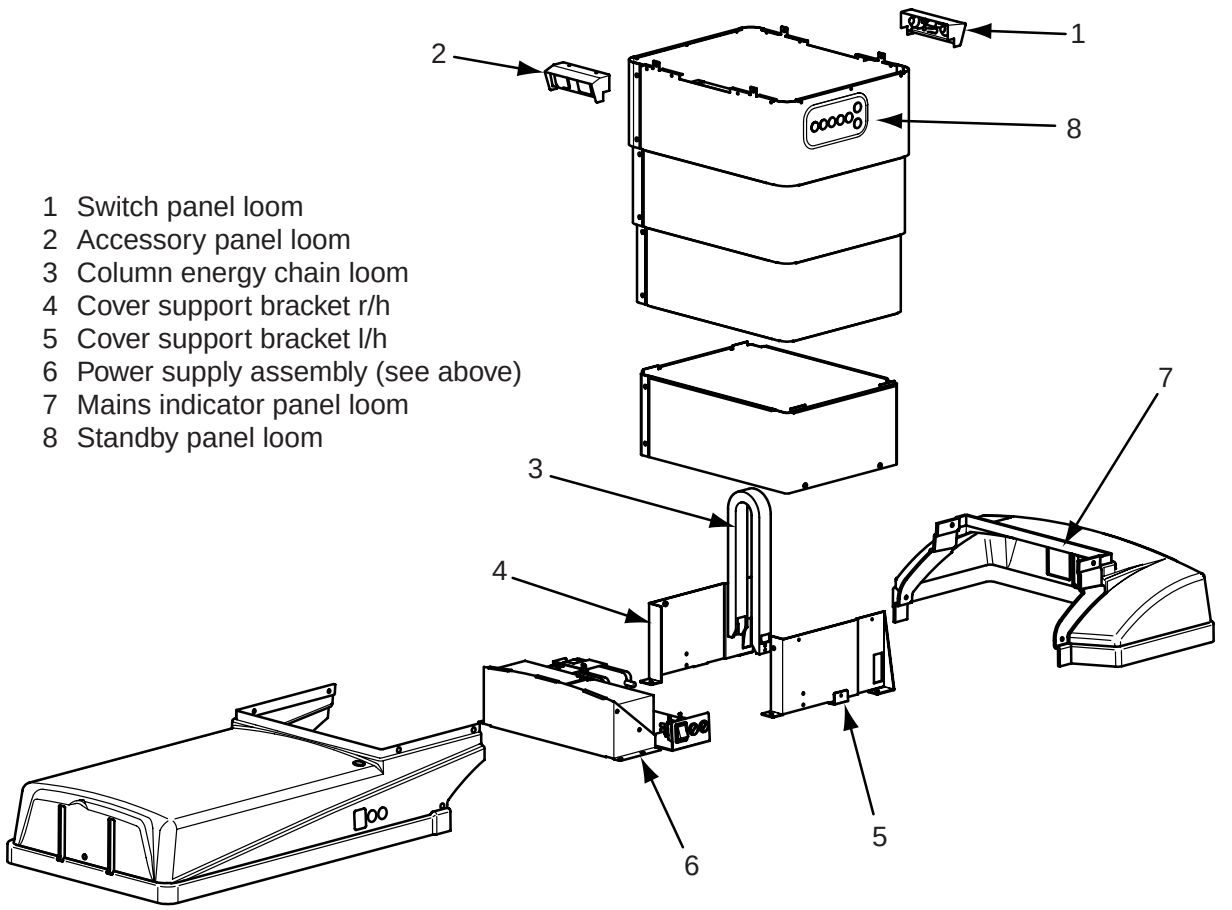


Fig. 6.8 Table base main electrical components

6.6.5 Power supply assembly

6.6.5.1 The power supply assembly, (item 6 of Fig. 6.8) is replaced as a complete unit.

6.6.5.2 Remove the long base cover as detailed in section 6.2.2.

6.6.5.3 To replace the complete Power supply assembly remove all external connections to the PSU (mains connection and energy chain loom). Remove the complete Power supply assembly by releasing the screws that secure it to the table base. Replace the new Power supply assembly and reconnect all the looms.

6.6.5.4 Reassemble the table and carry out a table function test.

6.6.6 Traverse motor

6.6.6.1 Prior to changing a traverse motor ensure that the unit has failed (and not the control circuit) by placing 24V (directly from the batteries in the table base) across the motor terminals or lead, see note below. If the motor fails to run in both directions replace it as detailed in section 6.5.2.1.
Note: To test motors Tool No. 2201 can be used, this consists of an inline 'on off'' switch with leads to clip onto the battery terminals and the motor terminals or leads. To reverse the motor direction reverse the battery connections.

6.6.7 Break motor

6.6.7.1 Prior to changing a break motor ensure that the unit has failed (and not the control circuit). **IMPORTANT Remove the motor from the short trunk section before continuing,** as detailed in section 6.5.2.3. Place 24V (directly from the batteries in the table base) across the suspect motor terminals or leads (see note in section 6.6.6). If the motor fails to run in both directions replace it as detailed in section 6.5.2.3.

6.6.8 Tilt and Trendelenburg motors

6.6.8.1 Prior to changing a tilt or Trendelenburg motor ensure that the unit has failed (and not the control circuit) by placing 24V (directly from the batteries in the table base) across the motor terminals or lead (see note in section 6.6.6). If the motor fails to run in both directions replace it as detailed in section 6.4.5.

6.6.9 Telescopic column assembly

6.6.9.1 Prior to changing a telescopic column assembly ensure that one of the two motors within the column have failed (and not the control circuit). Place 24V (directly from the batteries in the table base) across each of the motor terminals or leads in turn (see note in section 6.6.6). If either of the motors fail to run in both directions replace the telescopic column assembly as detailed in section 6.4.4.

6.6.10 Break potentiometer loom

6.6.10.1 To replace a break potentiometer loom (see note in 6.6.1) remove both the cover over the potentiometer and the short trunk bottom cover (item 3 or 11 of Fig. 6.6).

6.6.10.2 Remove the short trunk black top ready for recalibration. The potentiometer can now be removed by releasing the connector on the end of its short loom. Replace with a new break potentiometer loom.

6.6.10.3 The new potentiometer must be calibrated, check Appendix 2 and proceed as detailed in the 'Application software manual'.

6.6.10.3 Reassembling the table (using threadlock part number 670650 on all screws) noting any applicable torque values as shown in Fig. 6.5 and 6.6 and the note on Fig.6.6.

6.6.11 Tilt potentiometer loom

6.6.11.1 The tilt and Trendelenburg potentiometer looms (see note in 6.6.1) must be changed as a pair (they are on the same loom). Remove the trunk sections and top location angles as detailed in section 6.2.5.1 parts i-iv and the top of column cover (item 12 Fig. 6.1).

6.6.11.2 Gain access to the top of the column as detailed in section 6.2.3.3 and remove the connection on the four actuator PCA from the tilt and Trendelenburg potentiometer loom.

6.6.11.3 Remove both the potentiometers from the Trendelenburg frame (see Note Fig. 6.3) and replace them with the new loom assembly. Ensure the loom is replaced as found and connect to the four actuator PCA.

6.6.11.4 After reassembling the table (using threadlock part number 670650 on all screws) the new potentiometers must be calibrated, check Appendix 2 and proceed as detailed in the 'Application software manual'.

6.6.12 Trendelenburg potentiometer

6.6.12.1 The tilt and Trendelenburg potentiometer looms must be changed as a pair (they are on the same loom). See 6.6.11.1 above for details.

6.6.13 Height potentiometer loom

6.6.13.1 To replace a height potentiometer loom (see note in 6.6.1) raise the height of the table to make access easier and then gain access to the column as detailed in 6.2.3.

6.6.13.2 Remove the connection on the four actuator PCA from the height potentiometer loom then release (see note below) the lower end of the height potentiometer cable from the base plate and allow it to slowly retract back.
NOTE: DO NOT ALLOW CABLE TO SNAP BACK

6.6.13.3 Finally remove the height potentiometer assembly (item 17 of Fig. 6.3) from the lower edge of the wraparound assembly.

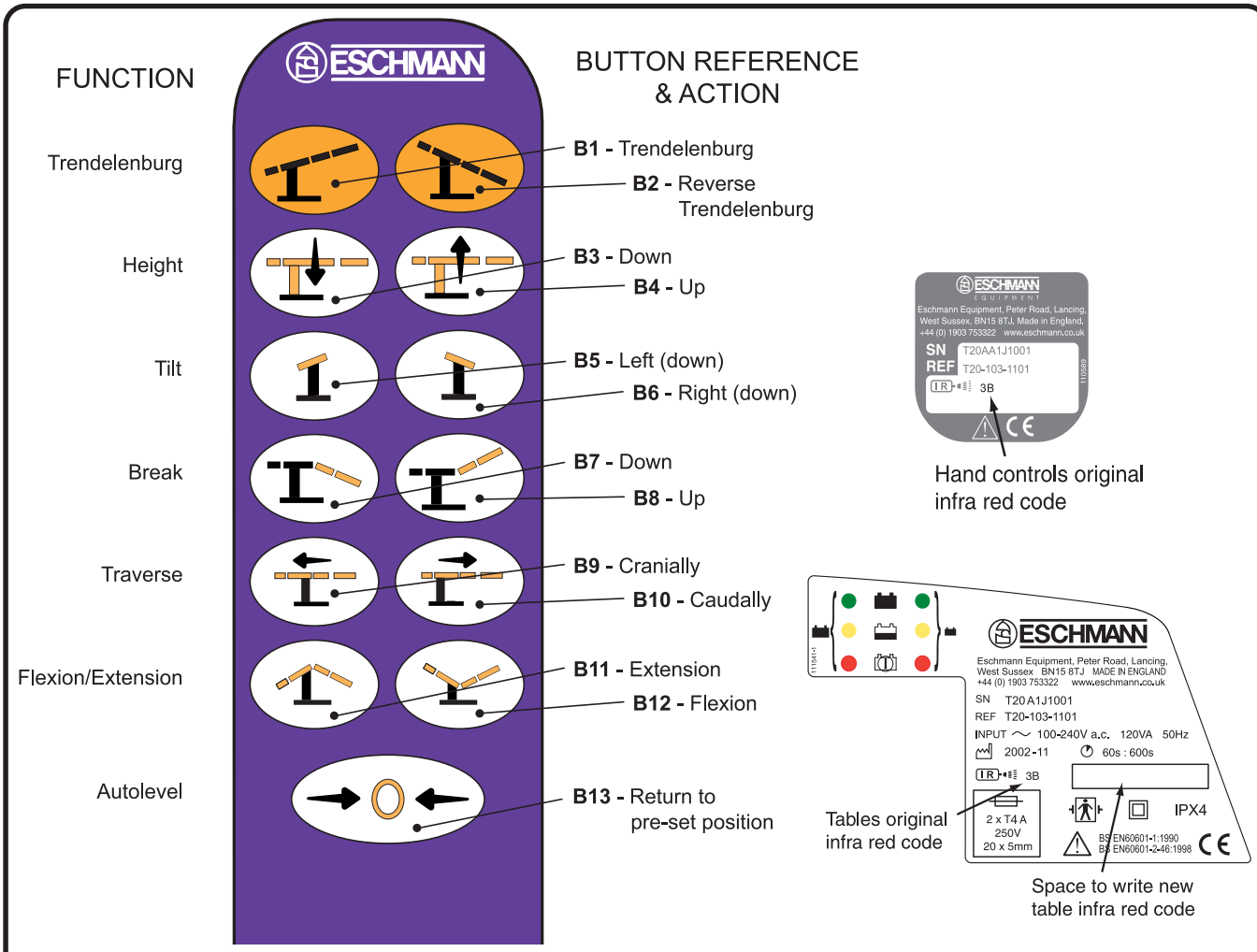


Fig. 6.9 Handset button functions and serial labels

Note: Labels shown above are examples, see the applied serial label for the actual data.

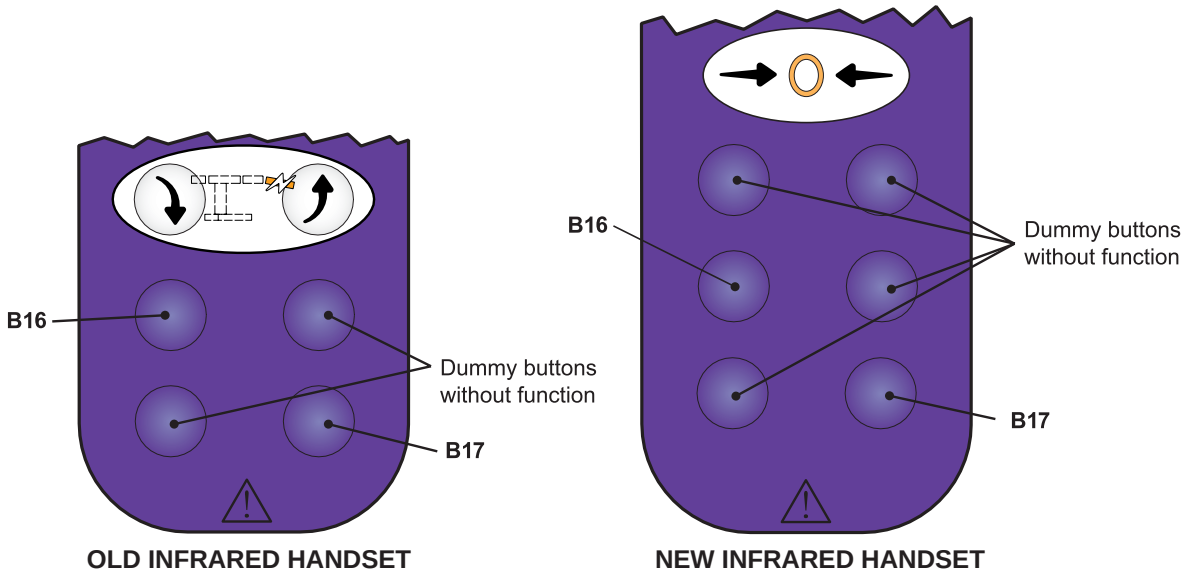


Fig. 6.10 Old and new infrared Handset buttons

6.6.13.4 Replace the new height potentiometer loom and reconnect it to the four actuator PCA. Re-fasten the cable to the table base and replace the covers. The height potentiometer must now be calibrated, check Appendix 2 and proceed as detailed in the 'Application software manual'.

6.6.14 Traverse motor loom and microswitches

The traverse motor loom and microswitches are within the crossbeam, see Fig. 6.7. (Note that all T20-a tables have the later switch arrangement). Change the traverse motor loom and microswitches as follows:

i Place table into the 'Service position' as detailed in section 1.9 (noting safety warnings in section 4.0) and then remove the bottom crossbeam cover (item 17 of Fig. 6.7).

ii Loosen the four set screws in the two traverse limit switch cams and slide out the traverse limit switch pins (take care not to lose the springs or headed bushes noting orientation). Disconnect the loom from the three actuator PCA.

iii Remove the M4 screws securing the two traverse limit switch brackets, slide them down and away from the cross beam and release the microswitches.

iv Fasten the new traverse motor loom microswitches onto the traverse limit switch brackets and reassemble by reversing the above, ensure the limit switch pins are fully inserted into the cams and are aligned without any torsional spring. Check the microswitches change state when the traverse limit switch pins are pressed and that all pins move freely.

v Check the new loom has been routed correctly and connected onto the three actuator PCA. Reassemble the table and carry out a full table function test.

6.6.15 Connector block assemblies and looms

The connector block assemblies (top, item 5 of Fig. 6.7 and bottom, item 14 of Fig. 6.3) enable the trunk sections to be removed without disconnecting any looms or wiring. Each part of the connector block assembly has a loom attached. These items are replaced as follows:

i To replace the top connector block and loom (which connects to the three actuator PCA) proceed as follows:

a) Gain access to inside the crossbeam by removing the head and leg section and then the trunk sections as detailed in section 6.2.5 for bellows replacement noting the warning at the beginning of section 6.2.5.

b) Remove the cross beam top cover (item 10 of Fig. 6.7) to gain access to the top connector block and loom. Remove the ring crimp terminals of the loom where they connect to the connector block noting connection annotation (R O Y B) for reconnection.

c) If replacing the loom disconnect it from the three actuator PCA and connect the new loom back as found. If replacing the top connector block release the two M6 screws to remove it, replace the new block and remake the ring crimp connections.

ii To replace the lower connector block and loom (which connects to the four actuator PCA) proceed as follows:

a) Remove the trunk sections from the table as detailed in section 6.2.5 for bellows replacement noting the warning at the beginning of section 6.2.5, but note that only the metal top of column covers (items 12, 13 and 14 of Fig. 6.1) need to be removed, the bellows can remain attached.

b) Remove the top of column cover (item 11 of Fig. 6.1).

c) Remove the ring crimp terminals of the loom where they connect to the connector block noting connection annotation (R O Y B) for reconnection.

d) If replacing the loom disconnect it from the four actuator PCA and connect the new loom back as found. If replacing the lower connector block release the two M8 screws to remove it, replace the new block and remake the ring crimp connections.

iii Reassemble the table and carry out a full table function test.

6.6.16 Switch and accessory panel looms

To replace either of these looms proceed as follows:

i Release the top of the bellows as detailed in 6.2.3.5.

ii Remove the connections from the PCA and then from inside the bellows release the retaining screws to remove the switch or accessory panel loom.

iii Replace the required loom, reassemble the table and carry out a full table function test.

6.6.17 Column energy chain and loom

To replace a column energy chain and loom (item 10 of Fig. 6.8) proceed as follows:

i Gain access to the lower column by lifting the telescopic covers as detailed in section 6.2.3.2 then remove the base covers as detailed in section 6.2.2.

ii Remove the two remaining connections coming from the bottom of the column energy chain loom where they join the mains panel and the power supply assembly. (Note that the other two connections to the infrared PCAs were removed when taking off the covers).

iii Remove the single connection coming from the top of the loom where it joins the four actuator PCA. Remove all other cable ties and loom restraints.

iv Remove the cable ties at both ends of the energy chain to gain access to the retaining screws securing the energy chain, remove the screws and take off the chain and loom assembly taking note of loom routing for replacement.

v Replace the new chain and loom assembly by reversing the above ensuring all looms are routed correctly and secured as found and clear of moving parts. Then test all table functions.

6.6.18 Break gearbox loom

To replace a break gearbox loom (item 19 of Fig. 6.7) proceed as follows:

i Remove the head and leg section and then the trunk sections as detailed in section 6.2.5 noting the warning at the beginning of section 6.2.5.

ii Remove the cross beam top cover (item 10 of Fig. 6.7) to gain access to the break gearbox loom securing screws. Remove the 'P' clips and connections to the break potentiometer, the three actuator PCA and spade connections on the break motor.

iii Replace the loom, remake all connections and secure the loom as found. Check Appendix 2 and proceed as detailed in the 'Application software manual'. Reassemble the table and carry out a full table function test.

6.6.19 Batteries, table and handset

6.6.19.1 To replace the table batteries, in the pedestal base, refer to section 6.3.2 and replace them as a pair (main or standby) also see 6.6.26 to recondition the battery management system if required.

6.6.19.2 To replace the batteries in the infrared handset proceed as follows. **Note:** Service kit part number 111040 (UK side rails) or 111745 (Denyer side rails) contains all the required parts, including a new spring clip and screws, also see section 6.6.23.1.

i Remove the six screws from the back of unit and carefully separate the front and back moulding, noting that the internal PCA is connected to **both** mouldings.

ii Remove both batteries and always replace both as a pair. Ensure the new batteries are replaced in accordance with the markings (+/-) in the moulding recess.

iii Replace the waterproof seal with a new one and ensure that it is in place within its seating (this is required to ensure the IP rating is not compromised). Check the connection on the PCA from the battery leads and the overlay are in place and that the PCA is resting on the moulded ledges near the batteries and correctly positioned over the two circular posts at the opposite end, before clipping the back and front mouldings together.

iv Replace the securing screws using the six new screws evenly and tighten them to a torque setting of 0.5Nm.

v Test the unit functions correctly.

6.6.20 Fuses

6.6.20.1 All the table fuses are detailed in the Technical Data Section 2.5.5. When replacing fuses check for any obvious causes and investigate the reason for failure if the fuse continues to fail.

6.6.20.2 To access fuses inside the covers, remove and replace the covers as detailed in section 6.2.

6.6.21 Table infrared, code change

6.6.21.1 It is possible to reprogram the identifier code of the table to match that of any handset, using a combination of button presses, proceed as follows:-

i Press and hold button B16 of Fig. 6.10.

ii Whilst continuing to hold button B16 press and hold button B17 of Fig. 6.10. There must be a short gap between these button presses and do not try to push them together or in the reverse sequence as this will not work.

iii Continue to hold both buttons B16 and B17 until the hand control LED (item 22, Fig 1.0) comes 'on' and then release the buttons. The LED will stay on for 2 seconds to indicate that the table identifier code now matches the handset. Test that the table responds correctly to the handset.

iv Write the new identifier code (i.e. the infrared handset identifier code) on the serial label of the table in the space provided (see Fig. 6.9) deleting the original one.

6.6.22 Infrared handset, code change

6.6.22.1 It is possible to change the identifier code of the infrared handset to match that of any table, obtain Service Kit Part No. 111040 or 111745 (see 'Note' in section 6.6.19.2) and proceed as follows:-

i Follow 6.6.19.2 (i) to gain access to the handset PCA.

ii Locate on the PCA the two switches controlling the infrared code. These should be set to match the code on the units label, see Fig. 6.9.

iii Using a slot head screwdriver of a suitable size rotate the switches to the required new control code (note each switch can be set to a hexadecimal setting of 0-F). Switch 1 is the first part of the two digit code.

iv Amend the label on the handset to reflect the new setting as clearly as possible in the space provided and delete the old code.

v Check all connections and reassemble the handset using the new screws and tighten them to a torque setting of 0.5Nm as detailed in 6.6.19.2 (iii-v) noting that the new seal is required to maintain the IP rating. Test that the table responds correctly to the re-coded handset.

6.6.23 Handset service

6.6.23.1 The Handsets do not contain serviceable parts but the infrared handset batteries and the spring clips on either unit can be replaced. If servicing the infrared handset service kit 111040 or 111745 (see 'Note' in section 6.6.19.2) contains all the parts required. Proceed as follows:

i Replace batteries in the infrared handset as 6.6.19.2.

ii Replace the handset spring clip by removing the old and replacing it with a new one using new screws and tighten them to a torque setting of 0.5Nm. (Do not use threadlock)

6.6.24 Processor PCA

6.6.24.1 Processor PCAs should not be replaced as a separate item, they must be changed together with and as part of the main actuator PCA only.

6.6.25 Standby panel and loom

6.6.25.1 If the standby panel is not functioning correctly or if the adhesive is showing signs of lifting away from the cover it should be replaced as follows:

i Lower the telescopic covers as detailed in section 6.2.3.2 and disconnect the loom from the panel.

ii Remove the old standby panel by peeling it off the cover and then remove any old adhesive from the column cover. Clean the cover well ensuring it is free from any dirt, dust or grease.

iii Adhere the new standby panel by removing the adhesive backing paper and pressing it firmly into place.

iv Reconnect the loom, reassemble (refer to section 6.2.3.2) and fully test the function of the new standby panel.

6.6.26 Battery management reconditioning

Battery management system reconditioning must be performed if the inline battery fuses or the batteries are disconnected for longer than 60 seconds or the table is stored without charging for an extended period of time. The system is reconditioned by fully charging the batteries so that both LEDs on the base turn green followed by discharging the table fully (i.e. until the main battery indicator on the handset turns red). The table can then be fully charged and used as normal. The process of fully discharging the batteries can be achieved during normal use although the handset indication will not give the true indication of battery capacity on this first discharge (i.e. LED may go from green straight to red).

6.7 FUNCTION TESTS

Before and after any maintenance procedure (part replacement, adjustment, calibration etc.) the table should be tested for function as follows:

6.7.1 Batteries

Check that both sets of batteries are charged by checking the corded handset LEDs, they should be 'green'. If either of the battery charge LEDs show 'amber' or 'red' place batteries on charge (leave table with batteries on charge at the end of the function test if both LEDs have not changed to 'green').

6.7.2 Battery charger

Check that when plugged into the mains the battery charging light shows 'red' or 'amber' (it will only show a 'green' LED after a two hour top-up battery charge). Also note Caution in section 1.0.

6.7.3 Corded handset

If the table has a corded handset operate the table through the cycle of movements detailed below in section 6.7.9 to test all the table functions and the corded handset.

6.7.4 Infrared handset

If the table also has an infrared handset and the table movements have been tested using a corded handset as above, test the infrared handset by operating at least a third of the functions briefly from the infrared handset. If the table movements have not been tested using the corded handset operate the table through the cycle of movements detailed below in section 6.7.9 to test all the functions using the infrared handset. Check that the infrared handset operates the table up to 1.5 meters.

6.7.5 Footswitch control

If the table also has a footswitch test footswitch by operating the table using all the footswitch functions in sequence.

6.7.6 Standby control panel

CAUTION

Do not power the table into combined tilt and Trendelenburg orientations from the standby control panel.

Operate the table from the standby control panel by using all of the available motions in each direction, levelling the table approximately after each motion.

6.7.7 Sections (head and leg)

Check that the head and leg sections fit correctly to the trunk sections, that all release buttons are working correctly, that each section can be adjusted to the amount shown in the Technical Data section (using a digital protractor) and that they lock securely in several different positions.

6.7.8 Base pedals

Operate each base pedal to ensure it functions correctly, that motion is correctly damped by the spring damper and that the return spring is in situ and working correctly.

6.7.9 Cycle of movements

CAUTION

During the following cycle of movements (designed to test all table functions) note that extreme care must be taken not to damage the table when powering the table to maximum movements (e.g. with table at minimum height maximum Trendelenburg cannot be achieved and with leg section fully lowered minimum height cannot be achieved).

1 Press the autolevel button until the table top has returned to level.

2 Operate the table into maximum tilt in both directions and confirm the amount of movement agrees with that in the technical data section (using a digital protractor). Return the table top to level with the auto level button.

3 See caution above. Operate the table into maximum Trendelenburg in both directions and confirm the amount of movement agrees with that in the technical data section (using a digital protractor). Return the table top to level with the auto level button.

4 Operate the table to maximum traverse in both directions and confirm the amount of movement agrees with that in the technical data section.

5 See caution above. Operate the table to maximum and minimum height and confirm the heights agree with those in the technical data section.

6 See caution above. Operate the table into maximum break in both directions and confirm the amount of movement agrees with those in the technical data section (using a digital protractor). Return the table top to level with the auto level button.

7 See caution above. Operate the table into maximum Flexion and maximum Extension and return the table top to level with the auto level button.

8 Lower both head and leg section fully, ensure the table is braked and switch it ‘off’. Leave batteries on charge if they are not fully charged.

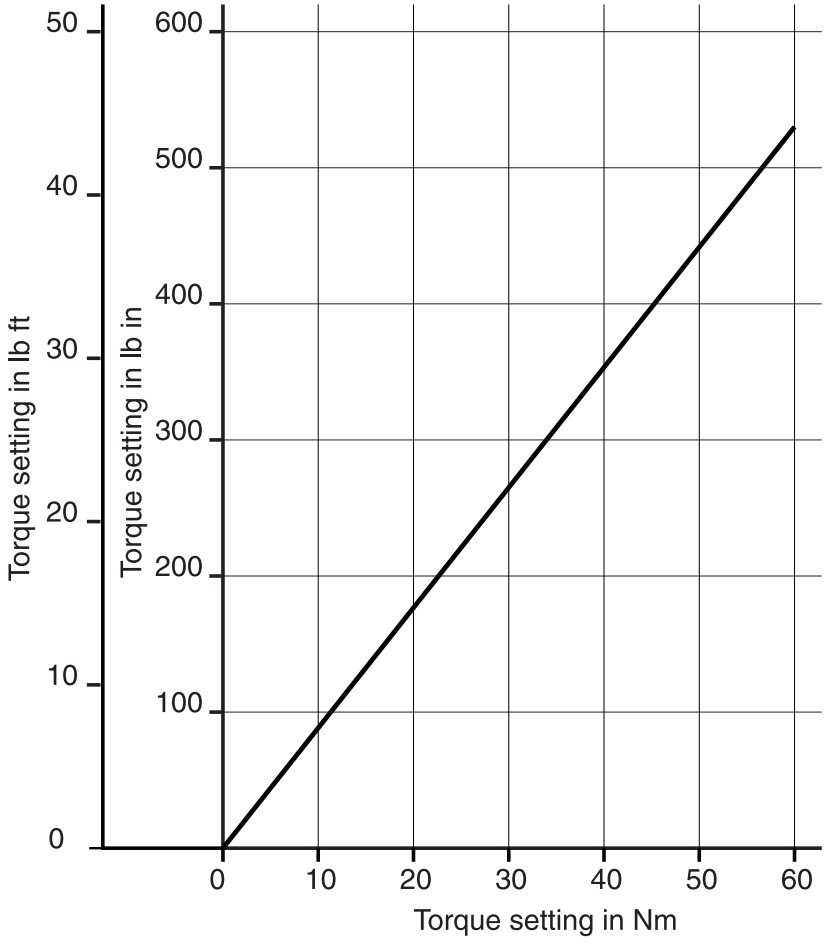
6.8 ACCESSORIES

Most accessories are basic in nature and part replacement is not usually required. Servicing is covered for similar items in the preceding sections (e.g. guide pin replacement). Cleaning and disinfection is the same as for the main table and is covered in the Instructions for use supplied with the product.

APPENDIX 1 - TORQUE CONVERSIONS

In the text of this document torque values are all detailed in Nm. If the torque tools being used are imperial use the chart below to convert the values to either 'lb in' or 'lb ft' as required. Always ensure that the equipment in use is both calibrated and that this calibration is valid (i.e. it has not expired). For accuracy the following conversion factors can be used:

1Nm = 8.85 lb in = 0.7375 lb ft



APPENDIX 2 - APPLICATION SOFTWARE GUIDE

When some parts are replaced it will be necessary to reprogram, reconfigure or recalibrate the table PCAs. The following list provides guidance on which parts and what actions need to be taken, when these parts are changed. After reassembling the table but before refitting covers (especially the short trunk black top in some cases) the table should be connected to a PC (boards and protractor if required) to enable the following procedures to be followed. Consult the 'Application Software Manual'.

Three actuator (3 axis) PCA

Program 3-axis controller
Configure 3-axis controller
Calibrate break right
Calibrate break left

Four actuator PCA

Program main controller
Configure main controller
Program actuator controller
Configure actuator controller
Calibrate tilt
Calibrate Trend
Calibrate height

Telescopic column assembly

Recalibrate height

Tilt bush

Recalibrate tilt
Recalibrate Trend

Tilt actuator

Recalibrate tilt

Trendelenburg actuator

Recalibrate Trend

Trendelenburg bush

Recalibrate tilt
Recalibrate Trend

Bearing pads

Recalibrate height

Break gearbox

Recalibrate break right or,
Recalibrate break Left as applicable

Break potentiometer loom

Recalibrate break right or,
Recalibrate break Left as applicable

Tilt/Trend loom (includes potentiometers)

Recalibrate tilt
Recalibrate Trend

Height potentiometer loom

Recalibrate height

Break gearbox loom

Recalibrate break right or,
Recalibrate break Left as applicable

APPENDIX 3 - SCHEMATIC DIAGRAMS

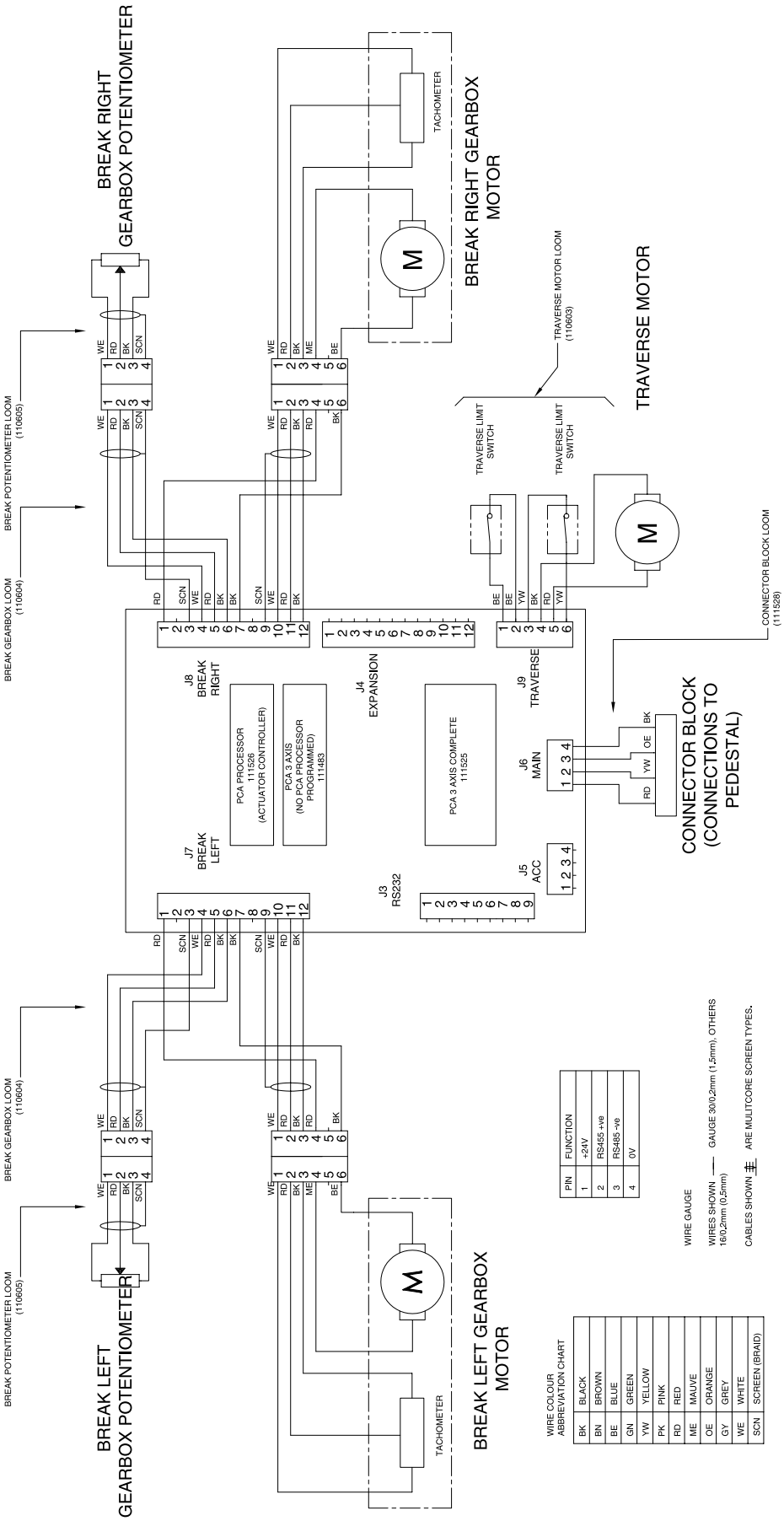


Fig. A1 T20-a Schematic diagram - Trunk Section

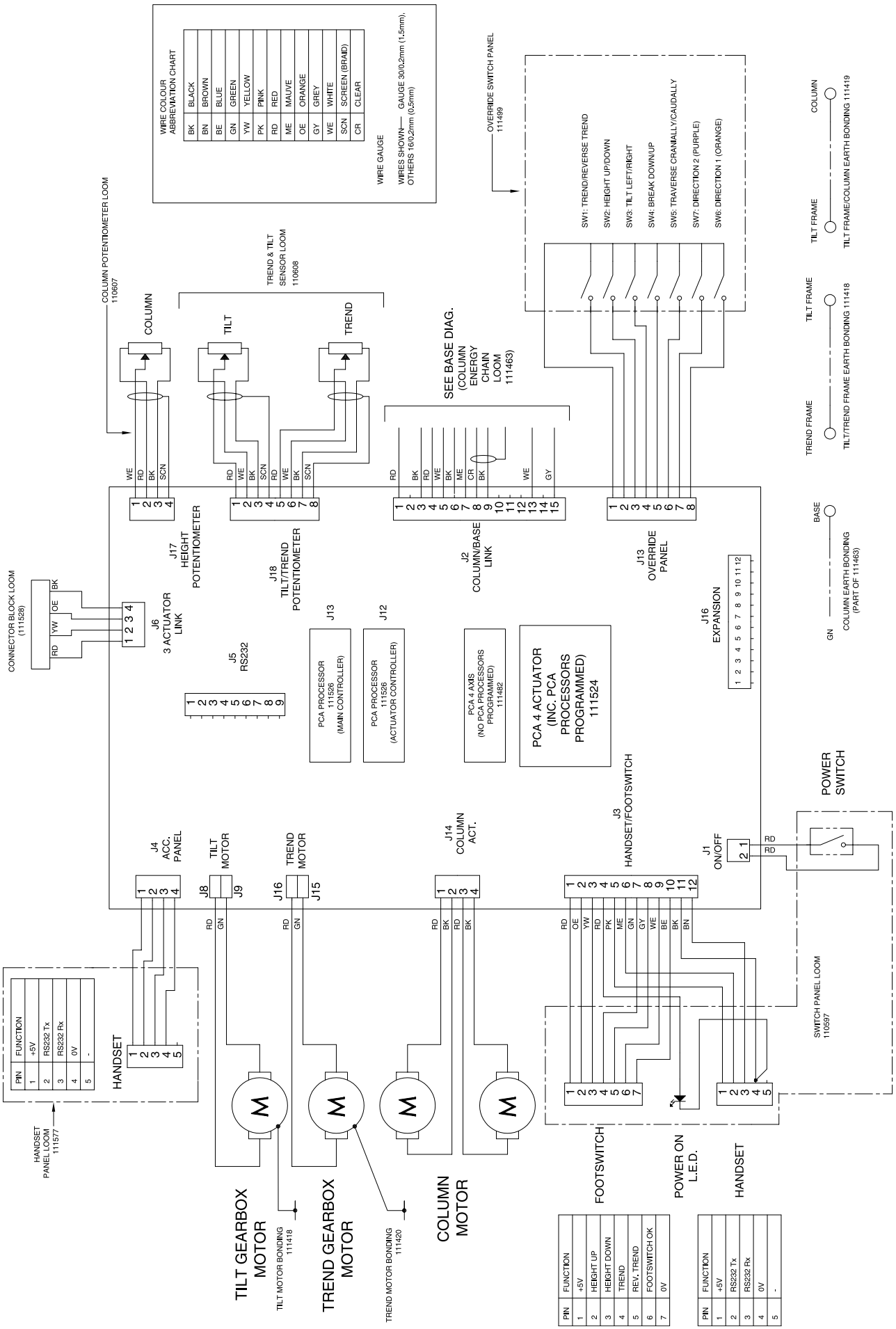


Fig. A2 T20-a Schematic diagram - Pedestal Section

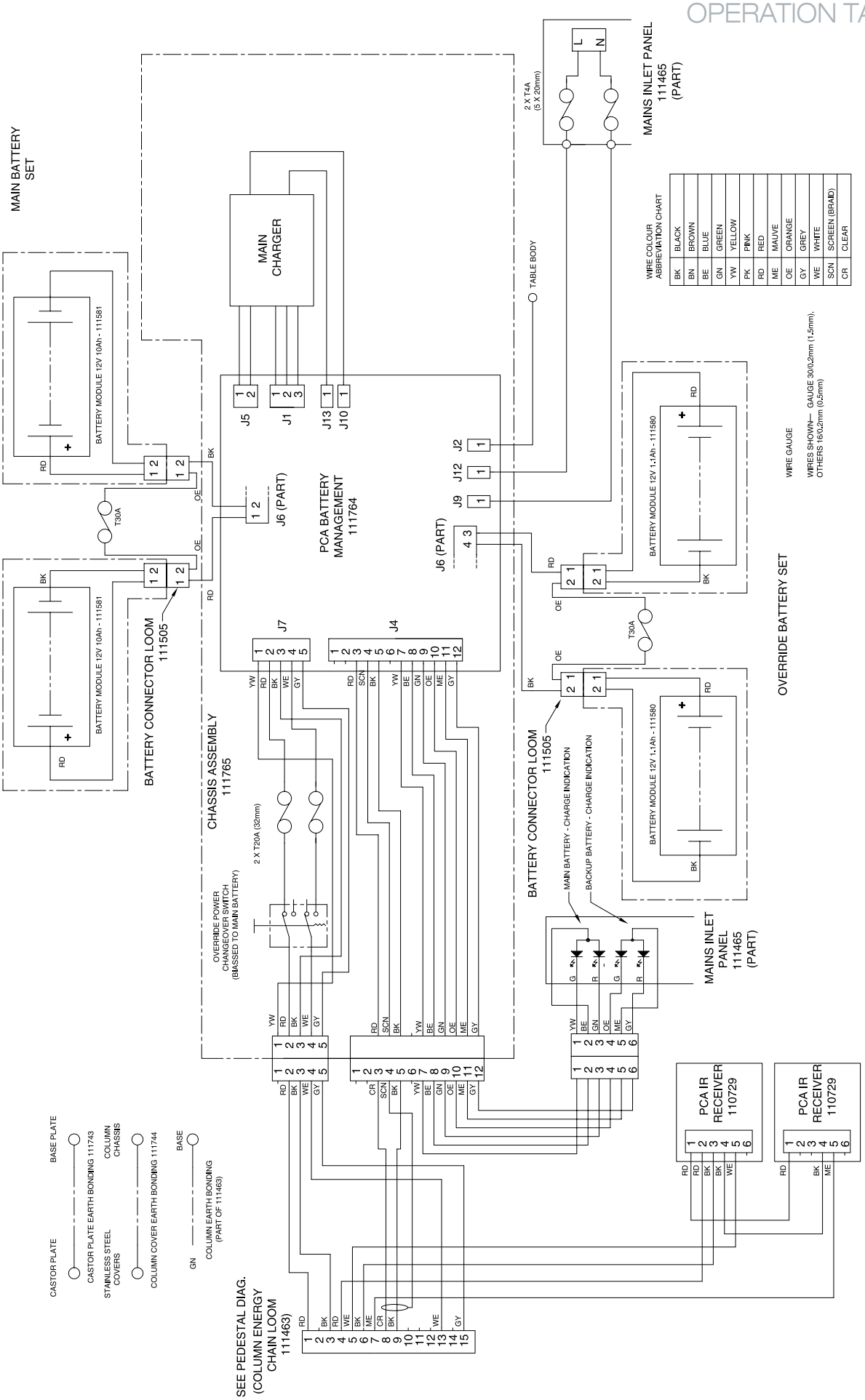


Fig. A3 T20-a Schematic diagram - Base Section

APPENDIX 4 - ELECTRICAL SAFETY CHECKS

WARNING
These electrical safety checks should only be undertaken in the following sequence.

The following three electrical safety checks should be undertaken after all maintenance procedures have been completed, with the covers on and the table in a 'ready for use condition'.

1.0 PAT testing

1.1 The table should be tested to ensure it conforms to the current requirements for PAT (Portable Appliance Testing) tests as detailed in the Eschmann Service Schedule No. 2011.

2.0 Antistatic path resistance

2.1 The antistatic path resistance should be measured using a 'Megger tester' switched to the 500V range as follows.

2.2 Connect one probe of the 'Megger' to a side rail of the table and the other probe of the 'Megger' to the surface of a castor wheel, of the castor assembly, to which the antistatic resistor is connected.
The reading should be 6.6MΩ ± 10%.

2.3 Connect one probe of the 'Megger' to a side rail of the table and the other probe of the 'Megger' to the surface of any other castor wheel (i.e. not the one used in 2.2).
The reading should be >100MΩ.

3.0 Enclosure leakage current

3.1 Using Tool No. 110721 and a DVM (digital voltage meter) test the enclosure leakage current of the table as below. (Note that in the tests that follow, 1mV=1µA)

3.2 Connect Tool No. 110721 to the mains and plug the table mains cord into the tool's socket.

3.3 Connect the other end of the table mains cord into the table's mains inlet socket.

3.4 Connect the 'Green' socket of the tool to the 'Enclosure leakage test probe'.

3.5 Connect the 'Enclosure leakage test probe' to a side rail of the table.

3.6 Connect the cords from the DVM (either way round) to the two 'Black' sockets of Tool 110721.

3.7 With switches 1 and 2 of the Tool 'off' and switch 3 'on', the DVM should read, '>10µA & <50µA' (if <10µA or >50µA there is a fault). Note reading for later. Disconnect the 'Enclosure leakage test probe' from the table and the DVM should read '0'.

3.8 With switches 1 and 3 of the Tool 'on' and switch 2 'off', the DVM should still read, '>10µA & <50µA' (if <10µA or >50µA there is a fault). Disconnect the 'Enclosure leakage test probe' from the table and the DVM should read '0'.

3.9 With switches 1,2 and 3 of the Tool all 'off' and the 'Enclosure leakage test probe' disconnected from the table, the DVM should read the same as noted in 3.7.

3.10 If readings above are too high this could be that a long mains cord is in use, if too low this could be mains supply is not 'on', mains fuses in table have blown, fuse in mains plug has blown, connection of equipment incorrect, or there is a fault in the table (mains wiring has failed open circuit).

3.11 Repeat sections 3.5 - 3.9 above but connect the 'Enclosure leakage test probe' to the middle two column covers simultaneously instead of to the side rail.

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